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PUBLISHING				
3-D Graphs		✓		
Built-in draw package		✓		
Individual cell font control		✓	✓	
Shading and borders		✓	✓	
Print graphs & spreadsheets side-by-side		✓	✓	
CONSOLIDATION				
Multiple spreadsheet windows		✓		✓
Multipage consolidation		✓		✓
Keyboard and mouse support		✓		
Lotus 1-2-3 v 2.01 compatibility		✓	✓	✓
Spreadsheet Capacity (NSTL) **	640K RAM	11	8	NA
	1Mb RAM	18	12	5
Price***		$495	$495	$495

*Clip art from PicturePaks™ by Marketing Graphics Inc (MGI)**NSTL (National Software Testing Labs) measured spreadsheet capacity by counting how many years of data could be added to a spreadsheet Large numbers mean greater capacity Performance for v 2.2 is with Allways attached
***Based on suggested retail prices as of October, 1989

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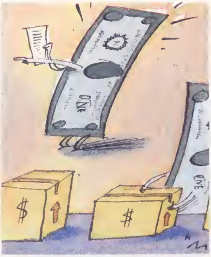
CIRCLE 101 ON READER SERVICE CARD

LOTUS



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STAFF LETTER

ABOUT TWO NEW STAFFERS

Before I tell you about the faces you see here, let me alert you to a note elsewhere in this issue. As I told you last month, templates and macros published in this year's issues are now available on CompuServe's World of Lotus. If that interests you, see page 87 for help.

Now for those faces. I want you to meet two key people who have recently joined this staff.

Justin Fielding has joined us as a section editor. His assignment is to direct our core tutorial coverage. That includes the how-to features we run on *1-2-3* and *Symphony*, as well as the regular tutorial columns on macros, program design, and the like. Q&A and Good Ideas also fall under his big umbrella.

Justin brings us an excellent background. After a few years of doing systems analysis and programming for both The Gillette Company and Bank of New England Corp., he went to Datacorp, a small Boston-based outfit. There he managed a group that does microcomputer training and consulting. He had lots of chances to see, firsthand, the problems that companies face in training PC users on *1-2-3* and *Symphony*.

Beyond that, Justin worked with many of the leading database, word-processing, and graphics programs that our readers use. And he is familiar with some key non-DOS operating environments—notably VAX and Macintosh—that will shortly become important to some *1-2-3* users.

For much of his life, Justin has hankered for an editorial career. Until recently, he indulged his interest in writing something other than proposals and documentation by contributing to the Boston Computer Society's monthly *BCS Update* magazine. In his new job here, editing and management come first. But you'll soon start to see his byline, too.

Cindy Davis and Justin Fielding

Our other new staffer is Cynthia Davis, who takes over as art director. Cindy graduated from Massachusetts College of Art and put in a short stint as a graphic designer. She joined *Inc.* magazine, where she became associate design director. From there she went to work at *Bicycle Guide* where, as art director, she executed an impressive redesign of the magazine.

Cindy's top priority right now is working with an outside design team to revamp our "look and feel." I don't want to say too much about that because, at this writing, it's still early in the project. But our goal is a magazine that will be more clearly organized, easier for busy readers to skim profitably, and, if you'll pardon some publishing jargon, a bit "brighter."

I'm pleased that we have Justin and Cindy on the team, and I'm confident that you will be too.

John B Campbell
John B. Campbell
Editorial Director

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TONY SCARPETTA

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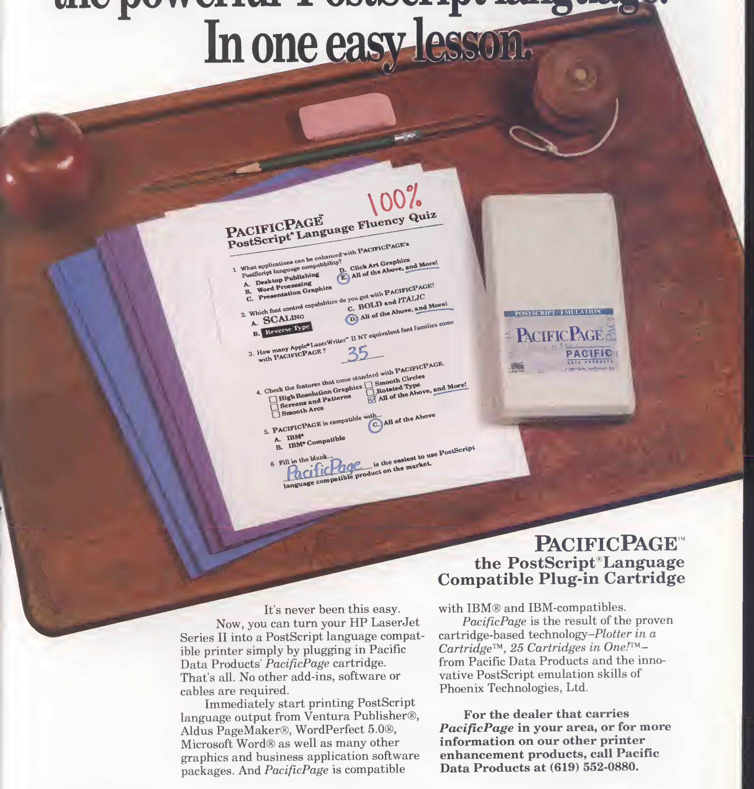

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CIRCLE 102 ON READER SERVICE CARD

LETTERS

WAITING FOR TOSHIBA

In "Laptops: The Compromises You Must Make" [August], you stated that Toshiba Corp. claimed to fix and return a defective laptop within a matter of days. When the motherboard in our Toshiba T3200 went bad, we returned the unit to our dealer, who in turn returned it to Toshiba for repair. That was two months ago! The only answer we can get from our dealer is that Toshiba can't get the parts.

If Toshiba Corp. is going to make these promises to the public, why can't it fulfill them?

Erik A. Cornet
Conair Tempro
Elgin, Ill.

Editor's note: *We asked Toshiba for a response, which follows.*

We apologize to Mr. Cornet for any inconvenience he had in trying to get his T3200 repaired. It is indeed our policy to fix and return a machine within a matter of days.

We were unable to find out from Mr. Cornet's service provider when the replacement part was originally requested. We have, however, determined that the provider ordered a second part, that Toshiba sent the part within three days of receiving the request, and that Mr. Cornet's machine has been repaired.

We encourage any user of Toshiba equipment to call Toshiba's field-service or product-support staff at 800-999-4CSD with questions about Toshiba's repair service and customer-support programs.

Mark Fritz
Computer Systems Division
Toshiba America Information Systems
Irvine, Calif.

NO VALUE PACK FOR SYMPHONY

"Goodbye Copy Protection" [July], which explains how to use Lotus's *1-2-3* Value Pack for copy-protection removal, is for *1-2-3* users only. I would like to know if there is a similar option available to users of *Symphony* Release 1.2?

And please tell me what driver to use for my printer—a DEC LA50.

Carl Pfeiffer
New Braunfels, Tex.

Editor's note: *There's no Value Pack for* Symphony *Release 1.2. But you can install the program on one hard disk to avoid having to insert the key disk. Your printer can use the DEC LA100 driver for both text and graphics.*

TO ERASE A CELL

In "A Spreadsheet for Everyone" [July], Daniel Gasteiger complains that *1-2-3* Release 2.2 lacks an often-requested feature: simple single-cell erasure.

I assume Mr. Gasteiger refers to the case of wanting to leave the erased cell empty. If he wants to replace the cell's contents, he need only type new contents and press Return to effect the change.

The simplest way to erase and leave a single cell empty is to move the cursor to the cell, press the Spacebar once, and press Return. The cell will be erased immediately.

John S. Hellewell
Vice President, Quality Assurance
Hofmann Mondial Inc.
Lynchburg, Va.

Editor's note: *It's not that simple. If you press the Spacebar and then press Return, you enter a space character in the cell. To confirm this, move the cell pointer to the cell you "erased" this way. In the control panel, you'll see an apostrophe, which indicates that the cell is not empty. Or use the @COUNT function to demonstrate that* 1-2-3 *considers the supposedly empty cell to be occupied. The Range Erase command is the only way to empty a cell.*

MUTUAL FUNDS: ANNUAL RETURN AND TAX RETURNS

Regarding "Keep Tabs On Your Mutual Fund" [July], I have a question about the validity of the formula for annualized return on initial investment (cell 011), particularly as it relates to the treatment of subsequent purchases. There is a market contribution (gain or loss) from any additional investment, so the market value of the additional investment would be different from the dollar amount invested. This then requires the total market value to be adjusted accordingly. How is the formula corrected for this effect?

Henry L. Bachman
Huntington, N.Y.

Editor's note: *We had a number of responses to this article. They fell into two groups. The first was from readers who had gotten incorrect results in column N and, as a result, columns L, O, and P. Most of these problems stemmed from missing inputs for the @DSUM formulas in column N, namely cells E9, R1, and R2. Inputs for these cells were described in the setup box on page 67, but they were not included in the figures that accompanied the article.*

Most other responses were positive, though some included requests and suggestions for change. This is something we anticipated, since there's a variation in the way different mutual funds do business and in the way people account for their money. For example, when the investor receives a cash payment from a sale or dividend, that cash is carried in the Fund Assets + Cash Withdrawals *column at a 0% interest rate. Many people would argue that this cash should accrue market-rate interest. But what if that interest rate changes from day to day? Or what if the investor spent some of the cash and reinvested only a portion of it? To account for those and other contingencies, the model would take on enormous proportions and yield limited benefits.*

Mr. Bachman did catch us on a question of semantics. Column O should have been called Annual Return on Outside Funds Invested. *That title more accurately describes the formula we used. If you do want to measure the annualized return on your initial investment, amend the formula in cell 011 to read:*

```
((@IF(M11>M$10,N11−(M11−
   M$10)+@IF(B10=“Purchase”,
   C10*(D10−D11),0),N11)/
   M$10)^(1/((I11−I$10)/365)))−1
```

Copy this formula down column O. If you're worried about the revenue generated by additionally purchased shares in the form of dividends or income reinvested, you'll have to edit this formula further, though it probably isn't worth the effort.

I found your article on mutual funds very useful. After comparing your spreadsheet with my own, I found that I had understated the tax basis of some of my mutual fund sales. Your article enabled me to file amended returns for 1986 and 1987, with a total refund of approximately $400. Thank you for your timely and useful hints in this area. I will be using my

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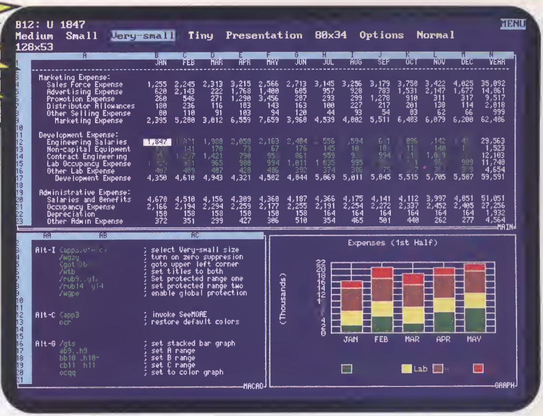

```
B12: U 1847                                                                              MENU
Medium  Small  Very-small  Tiny  Presentation  80x34  Options  Normal
128x53
               A                 B      C      D      E      F      G      H      I      J      K      L      M      N
1                              JAN    FEB    MAR    APR    MAY    JUN    JUL    AUG    SEP    OCT    NOV    DEC   YEAR
   -----------------------------------------------------------------------------------------------------------------
2   Marketing Expense:
3     Sales Force Expense    1,255  2,245  2,313  3,215  2,566  2,713  3,145  3,256  3,179  3,750  3,422  4,025 35,092
4     Advertising Expense      620  2,143    222  1,768  1,400    605    957    928    783  1,531  2,147  1,677 14,061
5     Promotion Expense        260    546    271  1,290  3,456    207    293    299  1,278    910    311    317  9,517
6     Distributor Allowances   180    236    116    103    143    163    100    227    217    201    138    114  2,018
7     Other Selling Expense     80    110     91    103     94    120     44     93     54     83     62     66    999
8       Marketing Expense    2,395  5,200  3,012  6,559  7,659  3,960  4,539  4,002  5,511  6,403  6,079  6,200 62,406
10
11  Development Expense:
12    Engineering Salaries   1,847 [illegible] 1,980 2,050 2,163 2,404 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] 29,563
13    Non-capital Equipment [illegible] 141  170     73     67    176    145     10     10     11    140 [illegible] 1,523
14    Contract Engineering [illegible] [illegible] 1,421 790  95    861    959 [illegible]  994 [illegible] [illegible] [illegible] 12,103
15    Lab Occupancy Expense [illegible] [illegible] 965 900  994  1,011  1,035    995 [illegible] [illegible] [illegible] 909 11,740
16    Other Lab Expense        407    409    407    420    406    392    374    306 [illegible] [illegible] [illegible] [illegible] 4,654
17      Development Expense  4,350  4,610  4,943  4,321  4,502  4,044  5,069  5,011  5,045  5,515  5,705  5,507 59,591
18
19  Administrative Expense:
20    Salaries and Benefits  4,670  4,510  4,156  4,309  4,360  4,187  4,366  4,175  4,141  4,112  3,997  4,051 51,051
21    Occupancy Expense      2,166  2,194  2,294  2,259  2,177  2,255  2,191  2,254  2,272  2,337  2,452  2,405 27,256
22    Depreciation             150    158    158    150    150    158    164    164    164    164    164    164  1,932
23    Other Admin Expense      372    351    299    427    306    510    354    465    501    440    262    277  4,564
                                                                                                                MAIN

        AA          AB            AC
2
3   Alt-I [illegible]             ; select Very-small size
4         /wgzy                   ; turn on zero suppresion
5         {got }b                 ; goto upper left corner
6         /wtb                    ; set titles to both
7         /rub9..y12              ; Set protected range one
8         /rub14..y14             ; set protected range two
9         /wgpe                   ; enable global protection
10
11
12  Alt-C {app3                   ; invoke SeeMORE
13        ocr                     ; restore default colors
14
15
16  Alt-G /gts                    ; set stacked bar graph
17        ab9..h9                 ; set A range
18        bb10..h10~              ; set B range
19        cb11..h11               ; set C range
20        ocqq                    ; set to color graph
21
                                                    MACRO
```

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CIRCLE 103 ON READER SERVICE CARD

If you own an earlier version of SeeMORE you can upgrade for $25. Send your original SeeMORE program disk to Personics along with your check and shipping instructions.

refund to extend my subscription to *LOTUS*.

Timothy N. Szymanski
Toledo, Ohio

Editor's note: *Filing a refund claim based on a recalculation of the tax basis for sold or redeemed mutual fund shares is allowable only under limited circumstances. Seek competent tax advice.*

HOW TO SAVE AN EMERALD

In the June Start Here column, you say, "To prove that you saved your work, select /Worksheet Erase Yes." This reminds me of the instructions for determining whether an emerald is genuine: "Heat the gem to 625 degrees Fahrenheit, then hit it smartly with a small metal mallet. If it shatters into hundreds of tiny pieces, it was genuine."

Perhaps a safer way to discover if a precious worksheet has been saved successfully is to select /File List Worksheet, then move the cursor to the file's name and compare the time shown with the time when the last save was attempted. If the time is earlier, or the file name is not there, then press the Escape key and try to save it again.

John J. Dyment
MML International Inc.
Westport, Conn.

Editor's note: *We did not mean to suggest /WEY as a general approach.*

PRINT OUT APPOINTMENTS

I am relatively new to both computers and *1-2-3*, and I find your magazine very helpful. Particularly educational is the challenge of working through the templates and models you offer each month.

I would like to thank Nick Delonas for "A To-Do List Manager" [June]. It was wonderful.

However, I'd like to alter the template so that when I select the Print option, I can enter a range of dates and thereby print appointments for several days (or weeks) at once. Any suggestions?

Robert Shinton
Reston, Va.

Editor's note: *Here's how to modify your template:*

Move the cell pointer to cell P165 and enter tmp2. *Use the Range Name Labels Right command to assign this label as the range name for cell Q165.*

Modify cell Q119 so that it reads:

```
{GETLABEL "Enter start date of
   items to print: ",tmp}
   {GETLABEL "Enter end date
   of items to print: ",tmp2}
```

Modify cell Q122 so that it reads:

```
{LET tmp,@DATEVALUE(tmp)}
   {LET tmp2,@DATEVALUE(tmp2)}
```

Modify cell Q126 so that it reads:

```
{R 4}{IF @CELLPOINTER
   ("contents")>tmp2}{L 4}{RETURN}
```

Your model will now print items between two dates. When you are prompted to enter the ending date, you must enter it in a valid date-string format recognizable by the @DATEVALUE function. For example, you can enter 10/01/89, but you can't enter today. *The prompt for the first date will accept either type of entry, as it did in the original model.*

PROGRAMMER PRIESTHOOD CLOISTERED

The writer who interviewed Philippe Kahn [June, Ideas and Trends] said, "Professional programmers have been likened to a priesthood." I was reminded of a comment made by Ben Bova, then editor of *Omni*, at an AAAS meeting in San Francisco some years ago. In discussing the need to provide instructions to microprocessor chips, he used the programmer-priesthood simile. Then he added, "In fact, some people refer to these programmers as 'chip-monks.' "

Howard L. Funk
International Business Machines
Armonk, N.Y.

SETUP STRINGS: TOSHIBA ALERT

If you know of a setup string that will produce compressed print on the Toshiba P1350, please notify me.

Amy Bornemeier
Portland, Oreg.

Editor's note: *The folks at Toshiba tell us that the P1350 does not support compressed printing. They suggest you try the following setup string: \027*1\027E08. This string yields Prestige Elite type at 15 characters per inch. They also suggest you make use of their printing-support hotline: 1-800-433-5999.*

Francis Bade, from Toshiba America, in Irvine, Calif., wrote with the following corrections and additions to the chart that appeared in "Setup Strings Can Control Printing" [March]:

*Pica—Toshiba uses Courier in 10 pitch. The setup string is \027*2\027E12.*

Cancel Emphasized—\027M (\027 \077 in decimal)
Underlined—\027I
Cancel Underlined—\027J
Master Reset—\027\026I
Italic—\027\018
Cancel Italic—\027\020

The strings for Italic and Cancel Italic are invalid for the P1340, P1350, and P1351, which do not print in Italic.

MANUSCRIPT USERS GROUP

I would be interested in starting a *Lotus Manuscript* users group, as suggested by Debra Schlei's letter [June].

If you would publish my address, I would be glad to receive letters and create a newsletter for the exchange of information on *Manuscript*. I have found it an invaluable tool in my work. As a medical-instrumentation company, we produce a large number of scientific papers requiring equations, special symbols, and graphs.

Cyndi Pote
Labsonics Inc.
611 North Capitol Ave.
Indianapolis, Ind. 46204

@ERR

"Expanded Memory Without New Equipment" (September): The price of *Turbo EMS* from Lantana Technology is $99.95, not $295.

"How to Build a Versatile Toolbox" (September): If you set up the macros in a different part of the worksheet than was shown in the article, the formula given for cell B9, in the righthand column on page 32, will not work. On line four of the formula, @STRING(B6,7) should read @STRING(!arg3,7). Because the formula is so long, you may not be able to edit it if you placed it below row 100. Simply reenter the entire formula with the correction.

Letters to the editor should be sent to Letters Editor, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123. Letters may be edited for length and clarity.*

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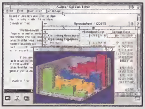

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1-2-3 ADD-INS: WHICH ONES STILL WORK?

LARRY LAWFER

Most work fine with Release 2.2 but not with Release 3.

For the most part, upgrading from *1-2-3* Release 2.01 to Release 2.2 or Release 3 is easy and straightforward. You may have a few more commands to learn, but you can load your old files, display your old graphs, and run your old macros. But what about your old *1-2-3* add-ins? Will they work with the new releases?

There's good news and bad news. The bad news: None of the add-ins written for Release 2.01 will work with Release 3. However, many add-in vendors say new versions are on the way, and the recently released Lotus Add-In Toolkit for Release 3 should speed things along.

The good news is that most popular add-ins written for Release 2.01 will run just fine on Release 2.2, although they won't support all of Release 2.2's new features. For example, network capability and the Undo feature are new in Release 2.2, and Release 2.01 add-ins won't take advantage of them. But otherwise, most add-ins still perform as they did before.

In developing Release 2.2, says Chris Noble, the program's design manager, one of Lotus's major objectives was to make the program compatible with existing add-ins. And to a large extent, it seems Lotus succeeded. A Lotus survey of 62 enhancement programs for *1-2-3* turned up only 5 that had to be modified to run on Release 2.2, and their developers report that the necessary modifications were minor and have already been implemented.

For those that needed modification, says Ken Lownie, Lotus's assistant manager for developer marketing, most of the compatibility problems were a result of the developer not following the rules. The rules, in this case, are the programming guidelines set forth in the Lotus Developer Tools, a set of disks and documentation that Lotus makes available to help developers write add-ins for *1-2-3* and *Symphony*.

Breaking the rules

However, a developer may have a good reason for straying from the guidelines. "There are things you just can't do with out going around the rules," says Don Selesky, the author of *@Base* and coauthor of *Look&Link*, two popular add-ins from Personics Corp. (Maynard, Mass.). According to Selesky, the *Look* portion of *Look&Link* had to be modified for Release 2.2 because his coauthor had indeed taken some creative liberties with Lotus's specifications.

Personics also had to make some changes to *SeeMore*, says Mark Feldman, vice president of sales, because of "some hooks that go right into the code." The effort was not major, he says, even though Personics added several new features to the add-in. *SeeMore* users can upgrade to the new version, 2.0, for $25.

Frontline Systems (Palo Alto, Calif.) had to revise two of its products slightly, but the fix was easy, says Dan Fylstra, Frontline's president. The company has updated *3-2-1 Blastoff* and *Project Calc* ($20 each) but did not have to modify *3-2-1 Gosub* or *Decision Analyst*.

General Optimization (Chicago) had to revise *What'sBest!* for Release 2.2, even though the program does not run inside *1-2-3* as a true add-in. Instead, just a portion of *What'sBest!* resides within *1-2-3* so that you can invoke it from your *1-2-3* worksheet. The program then exits from *1-2-3*, loads the rest of itself into memory, reads your worksheet, and creates a copy of it. When it's done optimizing your data, *What'sBest!* unloads itself, reloads *1-2-3*, inserts the optimized values into your worksheet, and saves the worksheet under another name.

It was the process of returning to the worksheet that required modification, says Mark Weston, General Optimization's vice president of marketing. *What'sBest!* had trouble finding its way back to the appropriate files because Lotus had moved the file names by two or three characters on the Release 2.2 directory screen.

The Release 3 outlook

The add-in situation for *1-2-3* Release 3 is dramatically different. Neither the add-ins written for *1-2-3* Release 2.01 nor those revised for Release 2.2 will work for this completely new version of *1-2-3*.

That is not to say that there won't be Release 3 add-ins and enhancements. In fact, at press time several Release 3 add-ins were already available. These include *What-If Analyst*, $49.95, from Frontline Systems, and three from Spreadsheet Solutions: *@Ease, FinCalc*, and *@Fixed_Income*. The latter carries a $25 upgrade charge if you bought the program prior to December 1988. In addition, Intex Solutions (Needham, Mass.) has Release 3 versions of *Forecast! for 1-2-3, Graph/Array, Trans for 1-2-3, Bond Yield Calculations*, and *Mortgage Backed Calculations*, at an upgrade cost of $25 each. At least a dozen or so more Release 3 add-ins are under development from Funk Software, General Optimization, Personics, Symantec Corp., and other vendors.

The development pace for Release 3 add-ins should pick up now that Lotus has released the Lotus Add-In Toolkit for Release 3 (see @Lotus, page 22). The Toolkit (formerly code-named LEAF), helps developers create tightly integrated enhancements, from custom @functions and macro keywords to complete applications. The Add-In Toolkit in effect provides a high-level programming language that, superficially at least, resembles Pascal but also uses some techniques similar to those of the object-oriented C++ programming language. It comes with its own editor, compiler, and debugger, along with a set of *1-2-3* Release 3 libraries that give developers access to the internal *1-2-3* code.

Instead of working with cryptic assembly-language commands, says Bill Lynch, principle technologist for Funk Software, the Toolkit lets programmers work in a more intuitive environment, using English-language statements. It makes add-in development much faster and easier, says Fylstra, of Frontline Systems, an early beta tester for the Toolkit. "I wrote the same program for both Release 3 and Release 2," he says, "and the Release 3 version was about 60% shorter and took about one third the time." Fylstra says Frontline intends to develop other Release 3 add-ins.

A wider audience

Unlike the Lotus Developer Tools for Release 2.01, which was used primarily by commercial developers, the Lotus Add-In Toolkit is also aimed at corporate users. Lotus's Lownie expects, for example, that corporate information-center managers

15 POPULAR ENHANCEMENT PROGRAMS FOR 1-2-3 RELEASE 2.2

Product	Vendor	Phone	Update Required[1]
@Base	Personics Corp.	508-897-1575	No
@Risk	Palisade Corp.	607-564-9993	No[2]
101 Macros Plus for 1-2-3	Individual Software	800-331-3313	No
3-D Graphics	Intex Solutions	617-449-6222	No
3-2-1 Blastoff	Frontline Systems	415-327-7296	Yes ($20)[3]
The Budget Express	Symantec Corp.	408-253-9600	No
D.A.V.E.	Goldata Computer Services	800-432-3267	No
FinCalc	Spreadsheet Solutions Co.	800-634-8509	No
Informix DataSheet Add-In	Informix Software	415-926-6300	No
Look&Link	Personics Corp.	508-897-1575	Yes ($10)[4]
SeeMore	Personics Corp.	508-897-1575	Yes ($25)
Sideways	Funk Software	617-497-6339	No
Slice Cut 'n' Paste	LightningWord Corp.	408-241-1990	No
Sqz! Plus	Symantec Corp.	408-253-9600	No
What'sBest!	General Optimization	312-248-7300	Yes

[1] Except where noted, the vendor will supply an update at no charge

[2] Versions prior to version 1.51 require an update; price varies

[3] Free if you purchased program on or after July 1, 1989.

[4] Free if you purchased program after August 1, 1989.

Data was provided by vendors.

will use the Toolkit to create in-house applications that they otherwise might not have attempted or might have tried to create with macros.

Macros can be powerful tools for automating existing operations. They cannot, however, add new commands, formulas, and @functions to *1-2-3* the way add-ins can, and they are far more vulnerable to alteration, damage, and misuse. "And if you're writing very sophisticated macros," says Fylstra, "you'd be better off using the Add-In Toolkit."

That's just what Mike Hudak, national marketing manager at Nielsen Syndication Service (New York), is doing. Hudak is using the Add-In Toolkit to update his macro applications for network and syndicated television program ratings. "With the Add-In Toolkit," he says, "we're developing custom menus that will enable our clients to develop their own ranking and tracking reports automatically and far more easily than before."

Nonetheless, using the Release 3 Toolkit is considerably more complex than writing *1-2-3* macros, says Lownie. He and other Lotus managers think that many individuals will still use macros rather than the Toolkit for their custom programming, even though a macro cannot actually add features directly into *1-2-3*.

With this in mind, Lotus beefed up the macro capabilities of Release 3 with a macro-record feature, a dozen new macro commands, and 26 new macro keywords for managing three-dimensional worksheets. —*Larry Magid*

A Bezier-curve editing feature gives you smooth curves at any resolution.

WINDOWS LURES DRAW PROGRAMS TO PCs

Workstations and Macs lose their market monopoly.

Ernest Lilley uses a computer to create complex drawings of protein molecules. A year ago, Lilley, who works at Neurogenetic Corp., a biotechnology research firm in Paramus, N.J., would have been limited to programs for the Macintosh or for workstations.

But Lilley is working with a PC-based program called *Micrografx Designer*. *Designer* is one of a new generation of sophisticated draw programs that run under *Microsoft Windows* on the PC. These programs are getting a boost from the growing success of *Windows* and are attracting technical illustrators, artists, and other graphic arts professionals.

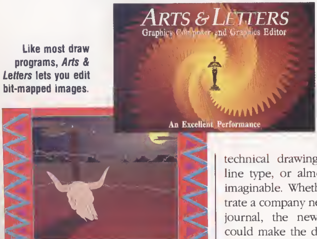
"PC-based draw programs will gain a respectable market share," says analyst Joan-Carol Brigham, of International Data Corp., a market research firm in Framingham, Mass.

Donna Bonyun, an analyst with the market research firm Dataquest (San Jose, Calif.), estimates that 454,000 DOS-based draw and paint programs were sold in the United States in 1988. Dataquest predicts about a 30% increase in 1990.

Software and hardware advances

Currently, there are four leading draw programs for the PC, all with comparable features. In addition to *Micrografx Designer* ($695, from Micrografx, Richardson, Tex.), these include *Corel Draw* ($495, from Corel Systems Corp., Ottawa, Ontario), *Adobe Illustrator–Windows Version* ($695, from Adobe Systems, Mountain View, Calif.), and *Arts & Letters Graphics Editor* ($695, from Computer Support Corp., Dallas).

These programs can create highly refined artwork, technical drawings, eye-catching headline type, or almost any other graphic imaginable. Whether you need to illustrate a company newsletter or a scientific journal, the new PC draw programs could make the drafting table a relic of another era. "There is probably no technical illustration," says Lilley, "that you'd be better off doing by hand than doing on a PC with draw software."



Like most draw programs, *Arts & Letters* lets you edit bit-mapped images.

Mark Charlesworth, product manager for *Corel Draw*, attributes the strength of the market to a new level of sophistication in the software. "The tools really weren't there before," he says.

"There is no question that the software has improved," agrees Mark Zachmann, president of ZSoft Corp. (Marietta, Ga.), a manufacturer of graphics software. "But equally important are '386 computers, advances in graphics and video monitors, and the increased speed of *Microsoft Windows*."

Manipulating all the information in a graphics file entails a great deal of mathematical computation by the PC. "A couple of years ago, the PC was simply too slow for that kind of work," says Dataquest's Bonyun. "PC hardware technology has finally gotten to the point where draw packages are of value."

One of the key new features in the latest draw software is Bezier-curve drawing and editing, which gives you a much smoother curve at any resolution. That means that PC-generated illustrations can match the precision of manually drawn illustrations.

More precision, better control

Precision is one of the main attractions of draw programs. For example, you can specify line widths as fine as a thousandth of a point, rotate symbols in tenths of a degree, and mix colors in increments as small as 1%. "I can do incredibly complex drawings on the computer," says Lilley.

Another popular feature, called autotrace, is found in some form in almost all draw programs. Autotrace lets you turn a scanned or imported bit-mapped image, which is essentially a collection of dots, into a fully editable image that you can refine with all the tools in the program.

Most draw packages also let you stretch and rotate type or even design a new font. Some packages let you specify color according to the color-matching systems that are used by commercial printers, and a few can even generate color-separation files.

These features spell good news for graphic artists. But for the layperson, learning a draw program may be more of an investment than it's worth. "You definitely need to make a commitment," says IDC's Brigham. "The general business market," she adds, "probably isn't tapping all the advanced features."

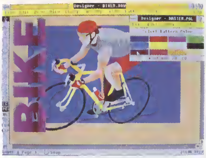
An approachable alternative

Paint programs are an alternative to consider. "They tend to be easier [than draw programs] for the casual user," says ZSoft's Zachmann.

Paint programs, such as ZSoft's *PC Paintbrush IV* ($99.95) and *Publisher's Paintbrush* ($285), create bit-mapped files. They work by manipulating series of dots, and they let you draw on the screen much the way you would put paint on canvas. Paint programs are also, as a rule, less expensive than draw programs. Most of them fall into the $100 to $300 price range.

"Paint software is good for original art and things like airbrush effects and color flexibility," says Marshall Landis, a technical-products specialist with Western Newspaper Litho Supply, in Baltimore. Draw programs offer greater drawing precision, better control, and more output options. In that way, they are like CAD (computer-aided design) programs.

In fact, comments one analyst, "the only difference between CAD programs and draw programs is about $1,500." But Zachmann points out that CAD packages offer features that draw programs don't, such as three-dimensional rotation and automatic image dimensioning.



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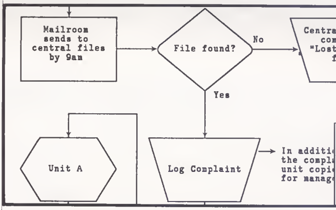
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Despite the feature overlap among draw, paint, and CAD programs, say analysts, the markets will remain distinct. "An engineer doesn't need a CAD package that can add special effects to text," says Zachmann. "It's just not relevant." Similarly, he says, after completing a drawing, most artists will never need to print a parts list—a standard feature in most CAD software.

Owing to the size of the PC market, however, says Micrografx's president, George Grayson, we can expect more and better draw software for the PC. "The best graphics will soon move from workstations to PCs," he predicts. "How can you afford to develop good software for a market of 150,000 or so workstations," he asks, "when there are 25 million PCs out there?" *—Jon Pepper*

HOW CORPORATIONS LEND A HELPING HAND

Grants, educational programs, and support for the disabled

On the sixth floor of the Glide Memorial Church building in San Francisco, eight preschoolers, many of them recent Asian emigrants, sit in front of PCs donated by Apple Computer. They are learning the English alphabet under the guidance of a patient volunteer teacher.

The class is part of a program called Computers and You. The program was begun last year by David Bunnell, who founded *PC World* and *Macworld*, Patrick McGovern, who heads International Data Group, the largest computer-industry publishing organization, and Cecil Williams, spiritual leader of the Glide Memorial Church. It's just one example of how firms and individuals in the computer industry donate their time and resources to philanthropic ventures.

Bunnell, McGovern, and John War-

BRUCE THATCHER PREDICTS A BOOM IN COLOR PRINTING

A bigger market and a smaller price tag, says NEC's director of marketing for printer products.

The demand for color printers is large and growing. But until recently, high-quality color output was a luxury few could afford. Color-output technology is more complex than that of monochrome output, and it requires more memory in both the PC and the printer. As a result, high-end color printers have been prohibitively expensive, at $25,000 and up, and affordable color printers have produced disappointing results.

But now it looks as if high-quality color will be more affordable. A year ago, for example, QMS (Mobile, Ala.) introduced its PostScript-based ColorScript 100 Model 30 printer at $24,995. Today, the printer costs $15,995. Moreover, in September QMS shipped the ColorScript 100 Model 10, a PostScript-based color printer that has a resolution of 300 dots per inch, at a price just under $10,000. And NEC Information Systems (Boxborough, Mass.) plans to announce a comparable—and comparably priced—printer this fall.

To find out where the color-printer market is heading, *LOTUS* contributor Jon Pepper recently spoke to Bruce Thatcher, director of marketing for printer products at NEC Information Systems. Thatcher joined the company before it introduced its Spinwriter line of impact printers in the United States 11 years ago. He has since overseen the development of subsequent generations of laser printers, dot-matrix printers, and the upcoming color printer.

LOTUS: Do you see an expansion of the color-printer market just ahead?

Thatcher: Yes. All indications are that the demand for color page printers will grow dramatically between 1990 and 1998. The expansion owes a lot of momentum to activity in the desktop-publishing and presentation-graphics markets.

Also, as OS/2 and the Macintosh System 7 operating system start to take hold, they'll bring color CAD (computer-aided-design) abilities to PCs. We expect to see rapid growth in the demand for color output among users of PC-based CAD programs.

LOTUS: Do you think color printers will make big inroads into the general business market, as well?

Thatcher: Yes, and quite soon. Color adds a lot of impact to a document and transmits information more effectively. Businesses are always looking for better ways to convey their information. As prices fall and as more people begin sharing color printers on networks, businesses will look more and more to a general-purpose color printer.

LOTUS: What other factors will drive the demand for color output?

Thatcher: The growth of affordable color copiers should help broaden market demand. A color printer is probably four to five times more expensive to run than a black-and-white printer, which makes it impractical for producing a lot of copies. Color photocopiers, on the other hand, are geared more for volume production than color printers will be.

ERIC ROTH

nock, president of Adobe Systems, contributed $105,000 to get Computers and You rolling. Other members of the computer industry, such as Borland International, Broderbund Software, Intel Corp., and Seagate Technology, have also donated software, hardware, and operating funds to the program.

David Autor, acting director of Computers and You, says the program regularly serves more than 250 children and adults in computer-based classes designed to raise basic literacy, impart specific computer skills, and instill self-confidence. "Many of our adults come out of drug recovery programs," Autor says. "To them, just taking a class is a risk," so they are given lots of opportunity for success.

Most of the large computer hardware and software companies make donations of cash and products to deserving organizations. IBM supplements this type of direct grant through an internal department called the National Support Center for

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Also, we are seeing more software with advanced color capabilities. All of these forces will help feed the development of lower-cost engines. Ultimately, I expect you will see color page-printer engines for well under $3,000.

LOTUS: What kind of engines?

Thatcher: Right now the best way to produce low-cost, high-quality color is with ink-jet or thermal-transfer engines. I lean toward thermal transfer because it provides better color saturation on transparencies than ink-jet technology. An ink-jet printer tends to produce washed-out colors on a transparency.

There is also a lot of speculation about laser-printer technology, but the future of color lasers is hard to predict right now. The stumbling blocks with laser technology are cost and reliability. Look how long it took for the price to come down on black-and-white lasers. Color reproduction is much more complicated than monochrome reproduction. When you add color, you don't just double the problem, you square it.

LOTUS: At what price point will color page printers become as commonplace as, say, the black-and-white laser printer is now?

Thatcher: I think the price point will have to be $2,000 to open up the market. However, a lot of technical issues still need to be solved.

LOTUS: What factors are driving down the price of color printers?

Thatcher: One factor is increased competition, particularly in the color ink-jet market. In addition, manufacturers are getting higher yields in the production of the head arrays for thermal-transfer printers. Also, the automated assembly of printers is helping to contain and drive costs down.

But the price drops aren't so much a result of new or breakthrough technology as of timing and the application of technology. One very important factor is the emergence of higher-performance PCs. The processing power required for color is so enormous that you need a high-performance PC to compute and handle all those pixels. These PCs are converging with advances in color copiers and in software that produces color output.

LOTUS: What trade-offs will be necessary to reach that $2,000 price point?

Thatcher: Paper size is one. You will be looking at machines that handle only legal- and letter-size paper. But for certain segments of the market, that will be an acceptable trade-off.

LOTUS: Will PostScript be an essential component of color printers?

Thatcher: Not everyone thinks so, but I do. One advantage is that you can use a color PostScript output device to specify colors according to the Pantone Matching System. In theory, you can then send the PostScript files to a commercial printer or publisher and get the highest quality output.

LOTUS: You say "in theory." What's the problem?

Thatcher: For commercial purposes, I think something will have to be done to get higher resolution. On the other hand, if you don't need magazine-quality reproduction, resolution is a lot less important for color than it is for black and white. With good dithering [the mixing of dots to produce colors], even a relatively low-resolution device will produce a lot of color. It gives the illusion of higher resolution. And the quality of the dithering depends on the controller board and the software.

LOTUS: How important—and how difficult—is it to match screen colors and output colors for a true WYSIWYG (what-you-see-is-what-you-get) environment?

Thatcher: It's not easy, in part because there are at least three or four display standards out there. But screen and output colors will eventually match more closely because users want WYSIWYG. In the meantime, the best way to control color reproduction is to use software that can handle the Pantone Matching System. Then, even if the screen color is off, the information will be processed through a Pantone algorithm and come out as the correct color. ■

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CIRCLE 106 ON READER SERVICE CARD

Persons with Disabilities, headquartered in Atlanta.

This innovative organization maintains a database of more than 600 products (most of which are not manufactured by IBM) and consultants qualified to help disabled people make use of personal-computer equipment and programs. Products run the gamut from speech synthesizers, screen enlargers, and braille output devices for the visually impaired to alternatives for standard keyboards that are useful to people with neuromuscular problems.

IBM's National Support Center also sponsors an outreach effort called the Executive Awareness Program. People from the Center have trekked to cities all over the country to tell IBM customers, government officials, social service agencies, and the general public about the kinds of technical tools that are available to assist the disabled. Finally, IBM has made its own products available to the disabled at a savings of 37% to 50% through programs such as the one sponsored by the Easter Seal Society.

Lotus Development Corp. also demonstrates its social concern in a number of ways. Lotus donates 1% of its pretax profits to charitable projects and institutions, with special emphasis on projects that combat racism.

Funded projects are primarily in the Boston metropolitan area, says Bryan Simmons, spokesperson for the philanthropic effort. An 18-employee committee, not part of the company's top management, administers the grant program. In addition, there's the Lotus Volunteer Alliance, a group organized and administered by volunteer employees, which works with local nonprofit organizations to teach computer skills and provide other services.

Another organization on the West coast, CompuMentor (San Francisco), has a cadre of more than 200 computer experts who provide skilled help to nonprofit agencies with technical computer problems. Affectionately referred to as ENERT, for Emergency Nerd Response Team, it intervenes when a nonprofit organization has run out of patience with the vagaries of computer systems.

CompuMentor fields the panic calls, explores its volunteer database for the needed talents, and sets up the rescue effort. One recent example: Mary Eisenhart, a CompuMentor regular, volunteered to help Bread & Roses, a musical nonprofit organization (put together by Joan Baez's sister Mimi Fariña) that gives concerts for people who can't get out to hear them—prisoners, hospital patients, and the like.

Bread & Roses had been considering a specialized (and expensive) software package designed for nonprofits. Eisenhart was able to show B&R not only that the costly package wasn't the best solution, but also that an off-the-shelf data-management program, *FileMaker II*, available by donation to qualified recipients from Claris Corp., could meet B&R's present needs and allow modifications specific to future needs.

—Richard Dalton

PROGRAMS WRITTEN IN REUSABLE CHUNKS

Object-oriented programs offer benefits to developers and users.

1*-2-3* Release 2.01 contains 80,000 lines of code. Release 3 has over 400,000 lines.

As programs get bigger and bigger, so does the problem of cranking out those programs in a reasonable amount of time. That's why software developers are turning to a technique called object-oriented programming. OOP saves substantial development time by allowing programmers to write or update programs by reusing segments of code originally written for other programs.

The idea of reusable code surfaced in the mid 1960s when Professor Kristen Nygaard, at the University of Oslo, developed Simula, an object-oriented language used to build massive simulations of nuclear reactors. Recently, Microsoft Corp. (Redmond, Wash.) and Borland International (Scotts Valley, Calif.) have released Pascal-language programs for personal computers that incorporate OOP technology.

The "object" in object-oriented programming refers to a self-contained unit that consists of both the program code and the data structures used to perform a set of functions. To add new functions to an object, a programmer can easily change either the data structures or the program code.

Objects can be found in a variety of current applications. For example, the windows, menus, and icons (tiny pictures) in the Apple Macintosh interface

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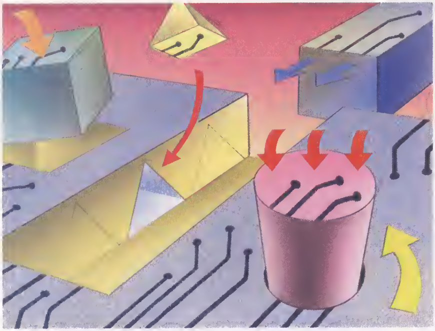

and in OS/2's Presentation Manager, as well as in such programs as *Microsoft Windows*, all represent objects. You manipulate an object by using a mouse to drag, size, or click on the screen representation. The application or operating system interprets these actions as commands and responds accordingly.

When you click on an icon, for example, you get a pull-down menu that contains a list of the functions that the object can perform. Then when you click on a menu choice, the program either sends a message directly to the object, or it gives you a dialogue box for specifying any additional data the object needs to perform the function.

C++ and Smalltalk are two of the many OOP languages that allow a software engineer to work with reusable blocks of code that print, scroll, add, or perform other computer operations. By breaking program code into separate, interchangeable parts, OOP boosts productivity two ways: It speeds application development, and it makes programs easier to maintain. Some professional OOP development systems contain thousands of objects.

OOP is catching on. In its third year, the 1988 Conference on Object-Oriented Programming Systems, Languages, and Applications (OOPSLA) had grown into the second largest conference sponsored

EASY MAINTENANCE

OOP languages are not only efficient for original programming, they also tend to produce well-organized code that is very easy to maintain. A change to OOP software generally involves fixing only one or two objects, a far simpler process than the massive reworking and debugging required for programs created with conventional languages.

Bjarne Stroustrup, Distinguished Member of Technical Staff at Bell Laboratories' Computer Science Research Center, wrote AT&T's OOP language, C++, between 1981 and 1985. Stroustrup says that with conventional code, any change in the code can destroy data or damage procedures. Reusing conventional code often requires extensive rewriting in order to fit the code into a new place in a program. Moreover, after every change programmers must thoroughly debug both the old code and the new code.

On the other hand, a programmer modifying OOP code can quickly find the right object, copy or modify it, and immediately see if the changes work. There is no need for global debugging, because with OOP there isn't the ripple effect that is normally associated with changes. —*R. M.*

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by the New York City–based Association for Computing Machinery (ACM). George Bosworth, chairman of OOPSLA '89, says attendance grew from about 900 researchers, developers, and vendors at OOPSLA '86 to more than 1,700 last year.

IBM, Ashton-Tate, Microsoft, AT&T, Hewlett-Packard, Lotus Development Corp., and other major hardware and software companies are all writing applications that use OOP tools. "We recognize the productivity benefits that OOP brings to users and programmers," says Colin Powell, technical planning manager for Presentation Management Systems at IBM's United Kingdom Laboratories, in Winchester, England.

For users, the most immediate sign of OOP's rising popularity will be the movement toward graphical user interfaces (GUIs). Powell says OS/2's Presentation Manager provides users with consistent menus, scrolling capabilities, and other common computer operations across a whole series of applications. A user will need to learn how to run a GUI system only once. Then, says Powell, it will be easy to master new programs that conform to the interface.

Over time, objects will become more intelligent. For example, a print command could automatically identify whether you want dot-matrix, laser, or plotter output. A network could automatically locate a file, no matter where on the network it was stored.

OOP also promises greater program customization. Bosworth predicts there will be a supermarket of object-oriented application modules. A user, for example, could add a spreadsheet to a word processor or graft text-editing features onto a database manager.

—Robert Moskowitz

9,600-BPS MODEMS PUT MORE DATA ON-LINE

Compatibility problems are out, new uses are in.

Who really needs a modem that operates at 9,600 bits per second? Brett Remington does, for one. Remington is data resources manager at IDC Financial Publishing (Hartland, Wis.), which puts together financial information on banks and savings and loans institutions for its clients. Recently, Remington began sending and receiving this data over 9,600-bps modems instead of 2,400-bps modems. The faster modems make a big difference. "It used to take a month to produce one financial report," says Remington. "Now we can do it in less than a week."

Remington uses the Exec-PC bulletin board in Milwaukee to send reports to his clients. Exec-PC system operator Bob Mahoney had 14 of the 9,600-bps lines installed in the first half of this year in response to popular demand. By 1990 he hopes to have 150 of the lines installed.

Just a few years ago, these faster transmissions were possible only on expensive leased phone lines dedicated to data traffic. The reason is that noise on an ordinary phone line could corrupt the data in high-speed transmissions. But the newer modems have overcome that problem. According to Josh Gonze, a research analyst with International Data Corp., a market research firm in Framingham, Mass., the move is on toward 9,600-bps modems that operate over ordinary phone lines.

About $129 million worth of 9,600-bps modems were sold last year, says Gonze, mostly for use on ordinary phone lines. By 1992, he predicts, U.S. vendors will sell $189 million worth of these modems. And that gain will be made in the face of rapidly falling prices.

Currently, you can get a 9,600-bps V-series modem from Hayes Microcomputer Products, the leading modem maker, for about $950 each in volume, says Hayes Senior Vice President Garry Betty. And a chip set from Rockwell International Corp. (Newport Beach, Calif.) will help Hayes's competitors match that price. But by 1993, estimates Gonze, a 9,600-bps modem could cost an average of $540, not much more than many of today's 2,400-bps products.

Even if you buy a 9,600-bps modem now, you can save the cost of leasing a phone line. In addition, since you can send and receive data faster, you save on connect charges. But more important are the things you can do over an ordinary phone line at 9,600-bps that are impractical at slower transmission speeds.

With a 9,600-bps modem, for example, PCs acting as cash registers can send sales data to headquarters as sales are made. Remote PCs can have the same access to corporate mainframes as directly connected terminals. And at 9,600 bps, you can download a large, bit-mapped graphics file in a fraction of the time it takes at 2,400 bps.

Compatibility problems, however, have slowed the acceptance of 9,600-bps service among public data networks such as Telenet and on-line services such as CompuServe. Hayes's V-series standard, for example, is incompatible with the U.S. Robotics's HST standard, which is incompatible with the standard used by Telebit Corp.'s Trailblazer Plus.

A solution to this problem has been proposed by CCITT, a standards-setting body based in Geneva, Switzerland. It's called the V.32 modulation standard. In recent months both U.S. Robotics and Telebit have brought out V.32-compatible 9,600-bps modems for use with ordinary phone lines, and many other companies are following suit.

Hayes, however, offers only one V.32 modem, a $2,000 product that is designed for use in private networks. For now, Hayes is sticking with its V-series, which can handle V.32 transmissions only at the half-duplex operating mode, which means you can't use it at 9,600-bps with services that require the 9,600 full-duplex mode.

But with V.32, more public data networks are beginning to offer 9,600-bps service. Tymnet, for example, offers V.32 support through its Tymdial 9.6 service, available in 20 cities. By the end of the year, Telenet will offer V.32 in 50 cities, along with support for Hayes's V-series standard. And if the higher transmission speed encourages users to find new reasons to be on-line, other networks will adopt it.

—Dana Blankenhorn

GREG COUCH

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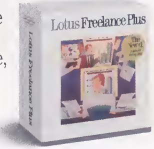

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REAL-TIME TRANSLATION

It may soon be a lot easier to do business with Japanese firms. There's already a small but growing business in translating Japanese information sources into English. US Fax (Philadelphia), for instance, will translate Japanese newsletters for distribution to American fax machines. Comline International Corp., owned mainly by Ipec Inc. (Tokyo), translates information from Japanese news services and distributes it to fax machines or computer screens through its Comline News Service.

Fujitsu America hopes to go all this one better with ScanFile, a real-time, online database translation system it demonstrated recently at the World Computer Congress in San Francisco. ScanFile takes the search request you enter in English, translates it into Japanese, relays it to a Japanese database, waits for a response, and translates the response back into English—at 60 to 80 seconds per request. A few weeks earlier, Fujitsu demonstrated a German-to-Japanese translation system that operated at 6,000 words per hour on a Sun-4/110 workstation.

"We believe our technology will eventually offer machine translation that is superior in speed and consistency to manual translation," says Masahiro Minami, vice president of Fujitsu America's Information Systems Group, in San Jose, Calif. ScanFile is expected to be available in the United States next year.

—Dana Blankenhorn

SCANDAL IN THE PITS

In September's Shorts section, we reported on efforts by the Chicago Board of Trade to conduct business by computer outside normal business hours.

A recent scandal in that city may hasten the day when computers replace traders permanently. In early August a federal grand jury indicted 46 CBT and Chicago Mercantile Exchange traders and brokers in commodities. They were charged, said United States Attorney Anton Valukas, with cheating "hundreds of customers" in "thousands of trades." More indictments were expected in the wake of plea bargains by some of the traders indicted.

At a mid-August press conference, the exchanges announced a plan that would require floor traders to record their deals on hand-held computer terminals. The terminals, not yet developed, would provide an electronic audit trail and should prevent any question of double dealing in the future, said spokesman Andrew Yemma of the Mercantile Exchange.

—D. B.

SCALING NEW TERRITORY ON THE PC

Bit-mapped computer images may soon be yesterday's news. Such, at least, is the view of market research firm Infonetics in Santa Clara, Calif. According to Infonetics research, while most of today's soft fonts and graphic images are in bit-mapped formats, scalable technology—such as the font-scaling techniques pioneered by Adobe Systems' PostScript page-description language—will eventually dominate the market.

Bit-mapped products aren't dead yet, says Michael Weiss, of MWA Consulting (Palo Alto, Calif.), but they will lose strength in the market over the next three to five years. Why? With bit-mapped fonts and graphics, you need to store a complete font for each point size or image size you want to use, which can take up a lot of disk space. A relatively simple document, for example, might easily contain three or four sizes of several typefaces, plus a few graphic images.

With scalable technology you wind up storing only the outline of a typeface. The software then scales the image to any size you specify, from an unreadable two points on up to the limit of your printer.

A program called *Streamline*, from Adobe Systems (Mountain View, Calif.), provides more evidence of the decline of the bit map. *Streamline* automatically converts bit-mapped graphic images into scalable PostScript-compatible outlines. After conversion, an image uses about 90% less disk space, and you can enlarge or reduce it with no deterioration in output quality—nearly impossible with today's bit-mapped graphics. Weiss predicts that more products like *Streamline*, either stand-alone programs or add-ins to graphic-design software, will reach the market.

—Jon Pepper

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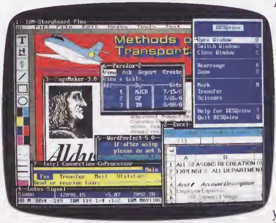

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NEW UTILITY CHECKS YOUR PC's MEMORY

This month Lotus Development Corp. plans to release *CHK123*, a diagnostic utility for evaluating your computer's memory configuration and determining whether your system has enough memory to run *1-2-3* Release 3 or any other application.

CHK123 reports on memory configuration, installed driver sets, and your system's ability to access the protected mode of '286 and '386 systems. To help you understand the reports, the utility provides technical explanations and a glossary of terms. If your system does not meet the requirements for Release 3, *CHK123* offers further suggestions and instructions. It tells you how to reconfigure memory from expanded to extended and gives you information on adding memory. *CHK123* also includes a discussion about the requirements and features of *1-2-3* Releases 2.2 and 3.

The utility will be distributed free through Lotus-authorized dealers and training centers, Lotus Product Support and Customer Service, Lotus Prompt CD, and Lotus sales and marketing representatives. It will also be widely available through user groups, from hardware and software vendors, and at trade shows. If you can't locate a copy, call 800-345-1043 to request one.

MORE ON THE DATALENS DEVELOPER TOOLKIT

In September Lotus Development Corp. shipped the DataLens Developer Toolkit. The Toolkit is a set of programming tools that enable developers to create drivers that connect Lotus applications, such as *1-2-3* Release 3, to external data sources. These include DOS and OS/2 database-management systems and databases residing on mainframes, minicomputers, or CD-ROM (compact disk, read-only memory).

Several industry vendors, including Computer Corp. of America, Gupta Technologies, Microrim, Oracle Corp., Teradata Corp., and Novell, say they are developing DataLens drivers. Lotus says that drivers for Sybase's SQL Server, IBM's Extended Edition Database Manager, and Borland International's *Paradox* are also under development.

1-2-3 Release 3 is the first Lotus application to incorporate the DataLens technology, but Lotus plans to build DataLens capabilities into future products. These include *1-2-3/G*, the company's graphical spreadsheet for OS/2 and Presentation Manager; Lotus/DBMS, a family of database application tools for OS/2 and Presentation Manager; and *1-2-3/M*, which is being jointly developed by Lotus and IBM for System/370 mainframes. A DataLens driver developed for a specific hardware platform will work with other Lotus applications operating on the same platform. For example, a driver written for *1-2-3* Release 3 will also work with *1-2-3/G*.

The DataLens Developer Toolkit costs $250. You may order it directly from Lotus by calling 800-345-1043. It includes the DataLens specification, code libraries, diagnostic tools, documentation, and a test application. Lotus will provide 90 days of free support for DataLens Toolkits purchased before March 31, 1990.

To use the Toolkit, you'll need an IBM PC AT, PS/2, Compaq, or compatible computer with a hard disk and 1 megabyte of system RAM under DOS (3 megabytes under OS/2). You'll also need a C compiler (Microsoft C Optimizing Compiler Version 5.1 is recommended), as well as a DataLens application such as *1-2-3* Release 3.

DataLens drivers will be distributed and supported by their developers. Lotus will list new drivers in its quarterly DataLens Driver Directory, available through all Lotus sales and service personnel. For information on specific DataLens drivers, call 800-343-5414.

LOTUS/SYBASE ALLIANCE

Lotus Development Corp. will acquire a 15% interest in Sybase, a leading vendor of relational databases for on-line applications. In addition, the privately held Emeryville, Calif., firm may sell another 10% of the company to Lotus at a future date. Financial details of the agreement were not disclosed. Frank King, senior vice president of Lotus's Software Products Group, will serve on Sybase's board of directors.

The agreement also covers joint development, marketing, and distribution for future products. Beginning with *1-2-3* Release 3, the two companies will work to ensure that Lotus's spreadsheet, database, and other applications exploit the multiuser data-management capabilities of Sybase's SQL Server technology.

"This partnership is an important step in our effort to provide our spreadsheet users with access to diverse sources of data," says Jim Manzi, Lotus's president and chief executive officer.

1-2-3 IN YOUR POQET

Poqet Computer Corp. (Sunnyvale, Calif.) will manufacture and distribute read-only memory (ROM) card versions of Lotus software for its new one-pound, IBM-compatible personal computer. The one-year-old company expects to ship the DOS-based portable, which operates on two AA-size batteries, before the end of the year at a suggested retail price of $1,995.

Slated to ship in the first quarter of 1990 are ROM-card versions of *1-2-3* Release 2.2 and *Lotus Agenda*, as well as a single ROM card containing both *Lotus Metro* and *Lotus Express*. Lotus will assemble and package the products, but Poqet will distribute them through its authorized dealers. The *1-2-3* Release 2.2 ROM card will cost $495 and will not include the *Allways* spreadsheet-enhancement technology. The *Agenda* ROM card will cost $395, and the *Metro/Express* ROM card will cost $235.

Lotus has a similar arrangement with NEC Home Electronics (Wood Dale, Ill.) for ROM-card versions of Lotus applications for the NEC UltraLite laptop computer, except that NEC's *1-2-3* ROM card is a version of the older Release 2.01. ■

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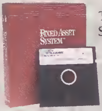

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START HERE

CONTROL YOUR DATA

Learn how to extract specific information from a database.

BY DANIEL GASTEIGER

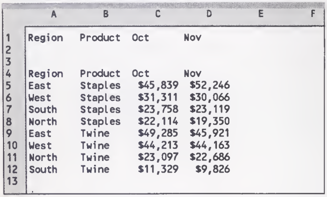
In the past two installments of this column we explored *1-2-3*'s database features. First we saw how to sort a database's records into alphabetical and numerical order. Then we learned how to create a Criterion range to find specific database records. This month we'll use the Data Query Extract command to copy selected information from a database.

DATABASE REVIEW

A database is a collection of related information. In *1-2-3*, database records are stored in individual rows. Each record contains information about a specific person, thing, or transaction. For example, a single record might contain employment and salary data for one employee.

Each database record is made up of fields, in which you store specific pieces of information. One field of an employee's record might contain his or her date of hire. Another field might contain the employee's current salary. In *1-2-3* each column of a database represents a field.

The following illustration shows a small *1-2-3* database that contains records in rows 5 through 12. The database has four fields: the *Region* field, the *Product* field, and fields for October and November revenue.



```
      A         B         C         D         E         F
1    Region    Product   Oct       Nov
2
3
4    Region    Product   Oct       Nov
5    East      Staples    $45,839   $52,246
6    West      Staples    $31,311   $30,066
7    South     Staples    $23,758   $23,119
8    North     Staples    $22,114   $19,350
9    East      Twine      $49,285   $45,921
10   West      Twine      $44,213   $44,163
11   North     Twine      $23,097   $22,686
12   South     Twine      $11,329    $9,826
13
```

You may have created and saved this database and its corresponding Criterion range if you worked through last month's Start Here. If so, retrieve the file. Erase any data that you entered in row 2 of the worksheet. Press slash, select Range Erase, specify range A2..D2, and press Return. Then skip ahead to the "Set The Criterion" section.

If you haven't created the database yet, start in a blank worksheet and enter the labels and values shown in range A4..D12 of the figure. This is the database Input range. Don't enter the dollar signs and commas that appear with the numbers in columns C and D.

After you enter the values, use the Range Format command to assign a currency format with no decimal places to range C5..D12. To do this, press slash, select Range Format Currency, and enter 0. Then type *C5..D12* and press Return. You've just created a *1-2-3* database.

Create the field names for the database's Criterion range by copying the database field names to the first row of the worksheet. To do this, press slash and select Copy. Indicate range A4..D4 as the range to copy from and cell A1 as the range to copy to.

SET THE CRITERION

Suppose that you wish to prepare a report of October sales in the South region. You've already entered all the data available about these sales and don't want to retype the information to create the report.

1-2-3 lets you copy selected information from the database into a separate area of the worksheet. This way, you can prepare simple reports quickly without searching through the database or reentering information. To create these reports, you must first prepare the Criterion range.

You may recall that we used a Criterion range in last month's article to help us find selected records. Let's review the fundamentals of using a Criterion range and see how we can use criteria to help extract selected records and copy them to another part of the worksheet.

The Criterion range consists of no fewer than two rows. The first row contains field names that match the database field names. The second row contains criteria that a record must meet before *1-2-3* will include it in a Data Query operation. A criterion might identify records with the word *South* in the *Region* field or records whose October sales are greater than $25,000.

Enter a criterion into the second row of the Criterion range, row 2 of the worksheet. Because you're going to create a report of South region sales, you must enter the

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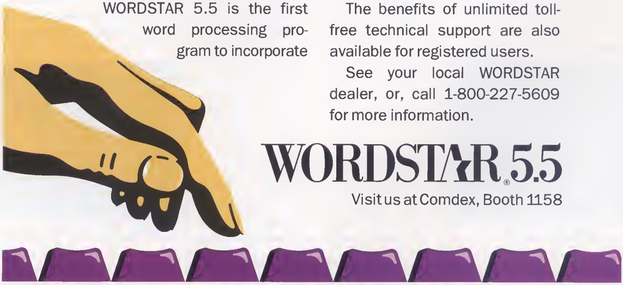

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criterion in the *Region* column of the Criterion range. Move the cell pointer to cell A2 and enter *South*.

Let's put our Criterion range to work. Press slash and select Data Query. Select Input and enter *A4..D12* (this will be the default for people working with last month's worksheet). Assigning the Input range tells *1-2-3* to perform all upcoming database operations using the data in range A4..D12. Next select Criterion and indicate range A1..D2. This confirms that the record-selecting criteria are in range A1..D2. Finally, select Find. The cell pointer expands and highlights the first of the database entries concerning southern revenues.

Press the DownArrow and UpArrow keys to navigate from one matching entry to another, then press Return when you're satisfied with your results. Select Quit to return to Ready mode. We discussed the use of the Data Query Find command in depth in last month's column. As you will see, the Input and Criterion ranges that controlled the Data Query Find command don't have to be specified again to use the Data Query Extract command.

CREATE THE REPORT

Little additional preparation is needed to extract records. The Data Query Extract command creates a report of selected records. All that's left is preparing a range to receive the information that we extract from the database.

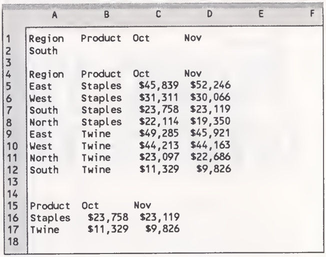
In this case, we're interested only in October's revenue for the South. Because all of the records in our report will be from the same region, we don't need the *Region* field. (If we were going to make a formal report, we could insert a label such as *October Sales for the South* above the data we extract.) The extracted data should also exclude entries from the *Nov* field. The Criterion range we set up will screen out the records for all regions except *South*. Somehow, we also need to tell *1-2-3* to copy information from only the *Product* and *Oct* fields.

To do this, create an Output range. When you use the Data Query Extract command, *1-2-3* will copy selected records from the database into the Output range. Create the range by entering the label *Product* in cell A15. Then enter the label *Oct* into cell B15. The field names in the Output and Criterion ranges must be spelled and punctuated exactly the same as they are in the Input range.

Select /Data Query Output and indicate range A15..B15. This tells *1-2-3* that the entries in cells A15 and B15 identify which database fields to copy from the database. You've already defined a Criterion range that tells *1-2-3* to extract only records that have the word *South* in the *Region* field.

Now select Extract. Immediately, *1-2-3* copies the South's revenue data for each product into the cells directly beneath the Output range's field names. Select Quit to exit the Data Query menu.

Suppose that you want the report to include November's revenues, as well as October's. Enter the field name *Nov* in cell C15, then reassign the Output range to include this new entry. Select /Data Query Output, press Escape, and indicate range A15..C15. This is the new Output range. When you select Extract from the Data Query menu, *1-2-3* copies the newly requested information, as shown above. After you choose Extract, select Quit.



```
        A         B         C         D         E         F
 1   Region    Product   Oct       Nov
 2   South
 3
 4   Region    Product   Oct       Nov
 5   East      Staples    $45,839   $52,246
 6   West      Staples    $31,311   $30,066
 7   South     Staples    $23,758   $23,119
 8   North     Staples    $22,114   $19,350
 9   East      Twine      $49,285   $45,921
10   West      Twine      $44,213   $44,163
11   North     Twine      $23,097   $22,686
12   South     Twine      $11,329    $9,826
13
14
15   Product   Oct       Nov
16   Staples    $23,758   $23,119
17   Twine      $11,329    $9,826
18
```

Exercise caution when using the Data Query Extract command as we've described it. When you assign an Output range that has only one row, *1-2-3* erases every entry in the cells below the Output range. No matter how small the extraction is, all data below the Output range is purged. A good habit, then, is to put the Output range below all other entries in a worksheet.

However, this can be impractical with large databases. If your database contains thousands of records, your Output range may not be large enough for some extracts if you put it below the Input range.

You can prevent the loss of data below an Output range by specifying an Output range of two or more rows. If you expect *1-2-3* to extract 25 records from the database, make the Output range at least 26 rows deep. The Data Query Extract command erases everything in the Output range, but it does not erase cells below the Output range. The command then copies matching records from the database.

If the Output range has too few rows to hold all the matching records, *1-2-3* informs you with the error message *Too many records for Output range* and stops copying. To clear the error, press the Escape key, then reassign an Output range that has enough rows and reissue the command.

Sometimes you wish to limit the information that appears in a database extract. Suppose that you wish to see the records for only those regions whose revenues from staples in October were more than $25,000.

Erase the criterion in the *Region* field of the Criterion range. Some people attempt to erase cells by entering a blank space. This does not truly erase the data and may cause problems when using a database. If you clear a field in a Criterion range this way, the Data Query command matches records that have blank labels. Select /Range

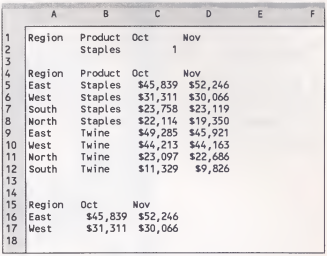
Erase and specify cell A2 to erase the old criterion.

Now enter the label *Staples* in cell B2, and enter the formula +C5>25000 in cell C2. The formula means the entry in cell C5 is greater than 25,000. This statement can be either true or false. If the statement is true, the criterion matches the first record and the formula returns 1. If the statement is false, *1-2-3* sees no match and the formula returns 0. The 1 in cell C2 tells you that, for the first record of the database, the result of the formula is true. The value of cell C5 is greater than 25,000.

It is essential that the above formula refer to cell C5 instead of some other cell in column C. As *1-2-3* looks over the database records in a Data Query command, it acts as if each record is the first one below the field names. When you issue the Data Query Extract command, *1-2-3* uses the formula in cell C2 to evaluate the entries in the *Oct* field one by one.

You need to change the fields in the Output range so that you can see regional information. Since you are only looking for staples data, you can replace the *Product* field with a *Region* field. Go to cell A15 and enter the label *Region*. Now select /Data Query Extract. *1-2-3* erases the existing entries from the Output range and copies the staples records for the East and West regions. Remember to save your worksheet for further practice.

Use your imagination to create some other complex criteria. If you wish to compare values in a criterion, write the equation as we have done to compare a value with the first database entry of the field in question. For example, the formula +D5<20000 in cell D2 of the Criterion range will cause *1-2-3* to extract only the records that contain numbers lower than $20,000 in the *Nov* field. Make sure as you fiddle with new criteria that you erase any old criteria so that they don't interfere with the matching process. ■



```
        A         B         C        D         E         F
1   Region    Product   Oct       Nov
2             Staples        1
3
4   Region    Product   Oct       Nov
5   East      Staples    $45,839  $52,246
6   West      Staples    $31,311  $30,066
7   South     Staples    $23,758  $23,119
8   North     Staples    $22,114  $19,350
9   East      Twine      $49,285  $45,921
10  West      Twine      $44,213  $44,163
11  North     Twine      $23,097  $22,686
12  South     Twine      $11,329   $9,826
13
14
15  Region    Oct       Nov
16  East        $45,839  $52,246
17  West        $31,311  $30,066
18
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Daniel Gasteiger is a contributing editor to LOTUS *and president of the software firm Tenet Educational.*

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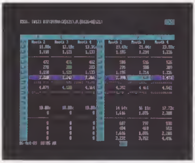

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1-2-3 MACROS

INSIDE THE NEW MACRO COMMANDS

New options in Releases 2.2 and 3 can make worksheets more powerful and more attractive.

BY NICK DELONAS

1-2-3's Releases 2.2 and 3 offer new macro commands, as well as enhancements to some existing ones. We surveyed these new features in the July Special Report. Now we'll take a closer look at their application.

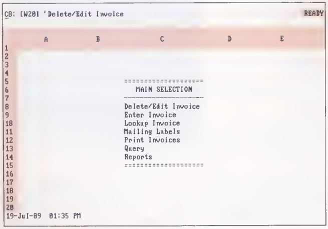
Both products give you greater control over the screen display. For example, there are expanded options for using macros to manage graphs. Macros can now directly call external programs. And one new command resets *1-2-3* to Ready mode.

Release 3 gives you even more new tools, including commands that make updating databases faster and easier. The new command options that we cover in this article are available in both releases except where indicated as exclusive to Release 3.

MORE SCREEN CONTROL

Both releases give your macros more control over the screen display. The {PANELOFF} command now accepts the optional argument "clear." {PANELOFF clear} not only freezes the control panel and status line, it also erases all information in those areas. It even erases the cell address and the mode indicator. This leaves the top three lines and the bottom line of the screen blank.

A command that you'll frequently use with the {PANELOFF clear} command is the {FRAMEOFF} command. It erases the worksheet frame—that is, the column letters and row numbers. {PANELOFF clear} and {FRAMEOFF} are useful for hiding extraneous information when using custom screens, such as menu lists and help screens. For example, imagine you have a worksheet that looks like the one in figure 1.

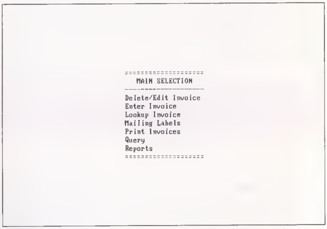


```
C8: [W20] 'Delete/Edit Invoice                                        READY

          A          B             C              D          E
1
2
3
4
5                          ===================
6                            MAIN SELECTION
7                          -------------------
8                          Delete/Edit Invoice
9                          Enter Invoice
10                         Lookup Invoice
11                         Mailing Labels
12                         Print Invoices
13                         Query
14                         Reports
15                         ===================
16
17
18
19
20
19-Jul-89  01:35 PM
```

FIGURE 1

After your macro issues the {FRAMEOFF} command and the {PANELOFF clear} command, the screen looks like figure 2.



```
===================
  MAIN SELECTION
-------------------
Delete/Edit Invoice
Enter Invoice
Lookup Invoice
Mailing Labels
Print Invoices
Query
Reports
===================
```

FIGURE 2

As you can see, the {FRAMEOFF} and {PANELOFF clear} commands give your application a clean, professional appearance. They stay in effect until macro processing stops or until the macro cancels them. The {FRAMEON} command cancels the {FRAMEOFF} command. The {PANELON} command cancels {PANELOFF clear}.

In earlier versions of *1-2-3*, the {INDICATE} command allowed the user to create custom mode indicators of up to five characters. The new {INDICATE *string*} command lifts that restriction and lets your macros display strings across the full width of the control panel. Figure 3 on the next page uses a macro named \i to illustrate the effect of this command.

Both new releases provide superior options for displaying graphs. The new {GRAPHON [*named_graph*][,nodisplay]} command lets you display the current graph or any named graph. The square brackets indicate optional

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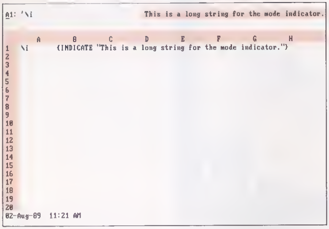


```
A1: '\i                           This is a long string for the mode indicator.

        A         B         C         D         E         F         G         H
1   \i        {INDICATE "This is a long string for the mode indicator."}
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
02-Aug-89  11:21 AM
```

FIGURE 3

arguments. When you use the optional arguments, this command lets you change the current graph without actually displaying it. For example, the command {GRAPHON lastyear} displays the graph named *lastyear*. *1-2-3* displays this graph until macro processing stops or until the macro encounters a {GRAPHOFF} command, a {?} command, or any command that displays something in the control panel.

The command {GRAPHON lastyear,nodisplay} changes the current graph to the graph named *lastyear* but doesn't display that graph. The {GRAPHON} command used without arguments simply displays the current graph. The {GRAPH} command in earlier releases requires you to press a key to clear the screen before macro processing can continue.

OTHER IMPROVEMENTS

The new commands give you more than just better screen control. The new {BREAK} command, for example, helps prevent macro mishaps. {BREAK} returns *1-2-3* to Ready mode if the spreadsheet is in any other mode. If *1-2-3* is already in Ready mode, the {BREAK} command has no effect.

To understand how this could help prevent errors, imagine a macro that enters the label *Weymouth, Massachusetts* in the current cell. If you called that macro while *1-2-3*'s main menu of commands was in the control panel, you would erase the worksheet. *1-2-3* would interpret the first three characters of the macro as the Worksheet Erase Yes command. Starting macros with {BREAK} helps prevent this kind of error.

The new {SYSTEM} command lets your macro call an external program or batch file with an operating system command. For example, {SYSTEM "DEL *.BAK"} temporarily suspends the *1-2-3* session and erases all files in the current directory that have a .BAK extension. The *1-2-3* session resumes automatically when the external operation stops, and processing continues with the next macro command, if there is one.

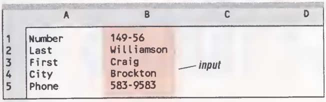
Not only can you make your macros more powerful, you can also make them easier to use. *1-2-3*'s macros can now use the {HELP} command to press the HELP key. More important, the {GET} command can capture the label *{HELP}* in a specified cell when you press the HELP key. These features let you develop custom help routines that respond to the same keystroke as *1-2-3*'s help system.

THE RELEASE 3 EXTRAS

Many of the new macro commands that are exclusive to Release 3 relate to its three-dimensional capabilities. However, some of these powerful additions to your macro-development arsenal are useful in a two-dimensional model as well.

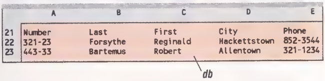
The {APPENDBELOW *target_location,source_location*} command copies the contents of the range identified by *source_location* to the rows immediately below the range identified by *target_location*. If any named ranges begin or end in the last row of the target-location range, the {APPENDBELOW} command expands these named ranges to include the new data. If the range identified by *source_location* contains formulas, the macro copies the current values of the formulas to the new rows.

To see how this works, consider the following data-entry screen:



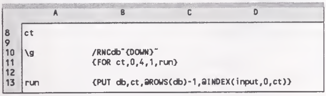
	A	B	C	D
1	Number	149-56		
2	Last	Williamson		
3	First	Craig		
4	City	Brockton		
5	Phone	583-9583		

After you enter the data in column B, a macro copies the range named *input* to the database shown in the following figure:



	A	B	C	D	E
21	Number	Last	First	City	Phone
22	321-23	Forsythe	Reginald	Hackettstown	852-3544
23	443-33	Bartemus	Robert	Allentown	321-1234

The range name of the database is *db*. The following figure shows the most effective macro for adding data to a database in Releases 2.01 and 2.2:

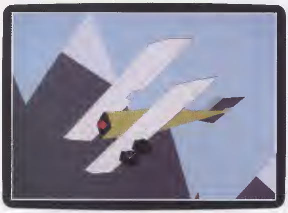


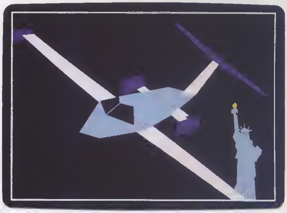
```
        A           B           C           D
8   ct
9
10  \g          /RNCdb~{DOWN}~
11              {FOR ct,0,4,1,run}
12
13  run         {PUT db,ct,@ROWS(db)-1,@INDEX(input,0,ct)}
```

This macro expands the *db* range by one row and then enters the information from *input* into the new row of the database. While this macro works reasonably well, expanding range *db* with the Range Name Create command is relatively time consuming. Release 3's {APPENDBELOW} command gives us the alternative at the top of the next page.

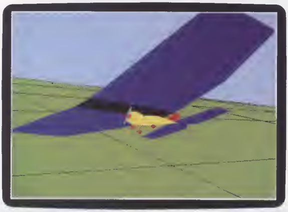
This macro uses five formulas in range A12..E12. We've

Experience the history of aviation.

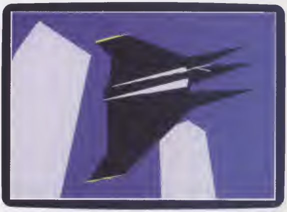




Or make aviation history.

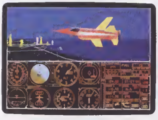


New Flight Simulator lets you put wings more commonly seen on a 747 on a Cessna and redefine the word "lift."

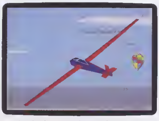


Brave souls can light up the Manhattan skyline with the most radical jet this side of the B2.

It's a known fact that Microsoft® Flight Simulator® provides the most realistic, exhilarating flying experience you'll find on a PC. Desktop pilots have taken to the skies in all kinds of different aircraft, from a WWI Ace to a modern-day jet.



The control panel lets you know exactly how much control you do, or don't, have.



And when you leave the ground, you don't even have to fly. You can glide, in our new sailplane.

Now we've added features to the new Flight Simulator 4.0 that'll throw you for a loop. Literally.

For starters, you can design your own plane. Which gives you the chance to investigate the acceleration characteristics of a 1000 horsepower Cessna. Or the lead-balloon characteristics of a wingless sailplane.

Equally adventurous is the weather. New Flight Simulator randomly creates clouds, wind, storms, you name it, when you least expect it.

We've also added an array of air and runway traffic, including a Boeing 767. You even get runway clearance from the control tower, to make every landing a happy one.

To get your flying career off the ground, see a Microsoft dealer.

You could discover that you're an aeronautical engineer. Or a natural pilot.

Or maybe, just maybe, you'll discover that most of your flying should be done at a desk.

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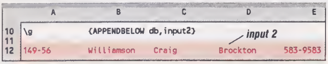


```
        A            B              C              D             E
10  \g           {APPENDBELOW db,input2}
11
12  149-56       Williamson     Craig          Brockton      583-9583
```

named this range *input2*. The formulas simply refer to each item in the Input range. Cell A12 contains the formula +B1, cell B12 contains the formula +B2, and so on.

The Release 3 macro does the same work as the Release 2.2 macro. But the logic of the macro is less complex, and thus it's easier to write. It's also more than 10 times faster.

The {APPENDRIGHT *target_location,source_location*} command works the same as {APPENDBELOW}, but it works horizontally. It copies the contents of the range identified by *source_location* to the columns immediately to the right of the range identified by *target_location*.

Before your macro can use the {APPENDRIGHT} or {APPENDBELOW} commands to add data to a database, it needs the data. The new {FORM} command is similar to the Range Input command, but optional arguments make it more powerful. It has the syntax {FORM *input_location*[,*call_table*][,*include_list*][,*exclude_list*]}.

The {FORM} command suspends macro control while you enter and edit unprotected cells in the range identified by the input-location argument. Unlike the Range Input command, {FORM} can check for specific keystrokes and run predefined macro routines. For example, if you are entering data and press the HELP key, {FORM} might branch to a help routine. Or you could press the CALC key and have the {FORM} command call a macro to recalculate the worksheet. {FORM} also lets your macro ignore certain keystrokes. Look for an in-depth report on the {FORM} command in next month's issue of *LOTUS*.

Once your macro has collected and organized the data, it can automatically save that data to disk. The new {CLEARENTRY} command makes such file manipulation easier than it used to be. It clears the current information from the edit line when *1-2-3* is in Edit mode. This sounds similar to the {ESC} command. But {CLEARENTRY}, or its abbreviated form {CE}, offers significant advantages. Unlike {ESC}, the {CE} command will clear all data from the edit line regardless of circumstance. For example, under some circumstances the {ESC} command does not clear all data from the edit line during a File Save command. The {CE} command always does. Another advantage is that while {ESC} returns *1-2-3* to the previous command level if the edit line contains no data, the {CE} command does not. So your macro can easily save files to a specific directory without knowing what the current directory is.

The remainder of Release 3's new macro commands relate to its three-dimensional capabilities, and they correspond to new keystroke commands. The table at the top of the next column lists these commands along with *1-2-3*'s corresponding key name and the actual keystrokes used on most computers.

THE 3D COMMANDS

Macro Command	Key Name	Keystrokes
{FILE}	FILE	(CTRL-END)
{FIRSTCELL} or {FC}	FIRST CELL	(CTRL-HOME)
{FIRSTFILE} or {FF}	FIRST FILE	(CTRL-END HOME)
{LASTCELL} or {LC}	LAST CELL	(END CTRL-HOME)
{LASTFILE} or {LF}	LAST FILE	(CTRL-END END)
{NEXTFILE} or {NF}	NEXT FILE	(CTRL-END CTRL-PGUP)
{NEXTSHEET} or {NS}	NEXT SHEET	(CTRL-PGUP)
{PREVFILE} or {PF}	PREV FILE	(CTRL-END CTRL-PGDN)
{PREVSHEET} or {PS}	PREV SHEET	(CTRL-PGDN)
{ZOOM}	ZOOM	(ALT-F6)

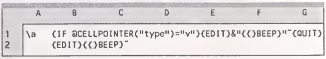
MACRO LETTERS

EDITING MACROS WITH MACROS

I recently wanted to append a {BEEP} command to the end of each line in a 200-line macro. I tried to write a macro in *1-2-3* Release 2.01 to do the editing but could not get one to work. How do you add a command to an existing macro with another macro?

A. G. Jackson
Winnipeg, Manitoba

The editor replies: To use a macro to add a keyword to another macro, you need to enclose the left brace of the keyword in another set of braces. The following macro will add a {BEEP} command to the end of the current cell whether it contains a label or a string formula:



```
     A     B          C          D          E          F          G
1   \a    {IF @CELLPOINTER("type")="v"}{EDIT}&"{{}BEEP}"~{QUIT}
2         {EDIT}{{}BEEP}~
```

Name the macro *\a*, and place the cell pointer on the cell you want to modify.

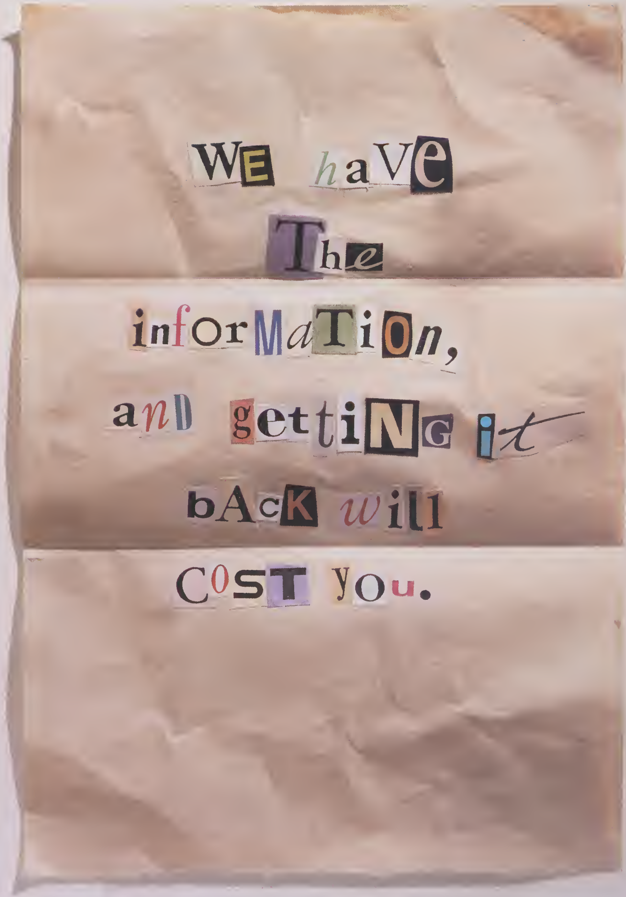
Here's how it works:

{IF @CELLPOINTER("type")="v"}{EDIT}&"{{}BEEP}"~{QUIT} checks to see if the current cell contains a value. If it does, the macro assumes the cell contains a string formula, appends &"{BEEP}" to the end of it, and then halts macro execution.

{EDIT}{{}BEEP}~ appends a {BEEP} command to the end of a label. These commands are only processed if the current cell does not contain a value. ■

Send Us Your Macros

If you have questions about macros, send them to us. If you have a favorite macro technique, we'd like to see it. If we use your letter in a column, we'll send you $25. Write to: Macros Editor, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123.*



WE have
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information,
and getting it
back will
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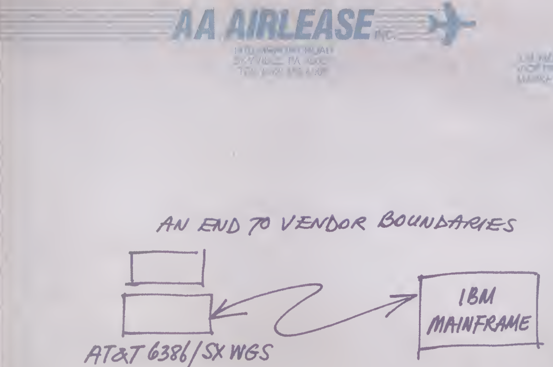

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Now the solution's as simple as the example in the first drawing above. A new AT&T 6386/SX Work-Group System links to an existing IBM® host and gives your people access to important corporate data held there.

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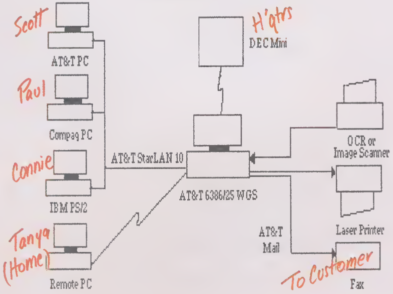

dards (SNA in this case) that let AT&T's new Networked Computers work smoothly with the systems you already have.

How to share new applications and precious resources. Take the case of Scott, Paul, Connie and Tanya in the second diagram. They each rely on expensive peripherals, but you can't afford to get them individual sets. And their complex, networked application would really strain your existing DOS server.

Enter the AT&T 6386/25 WGS, our entry-level UNIX® System V server. UNIX System V is the only desktop operating system *designed* for communication-intensive applications. And since it also supports AT&T's OPEN LOOK™ Graphical User Interface, life can be visibly easier.

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In fact, AT&T has configured, packaged and tested solutions including communications, database and image servers. Just let us show you.

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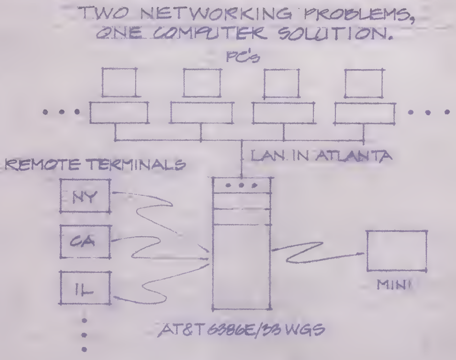

Simultaneous solutions. Chances are you need a server to support information sharing in a local PC network. Fair enough. But here's a Networked Computer that will also manage a nationwide database at the same time.

With headquarters in Atlanta, you have people in two dozen offices scattered across the U.S. Because geography makes interoffice agreement difficult, you feel more like twenty-five little companies than one big one.

In Atlanta, put 600 MB of data into the disk space of an AT&T 6386E/33 WGS. Place asynch terminals in your field offices, and connect them directly to the 6386E/33 WGS. Suddenly, everyone's working with the same numbers, the same names, everything. Which, at about 7.7 MIPS, is power that would make some mainframes blush.

Now, shift into high gear by connecting the PC LAN you already have in Atlanta. We provide the systems and expertise you need to support LAN *and* remote terminal applications at the same time.

And for mission-critical Networked Computing, our solution is the AT&T 6386E/33 WGS Model S. It shines in networks like the one shown in the final diagram—where every bit

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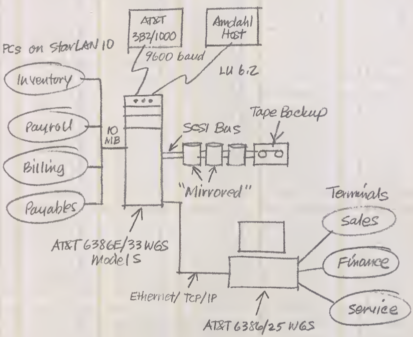
*One-year, on-site warranty.

No mission-critical maybes.



of information from people in one department can trigger action by people in another.

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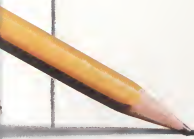

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and number of locations ____________

Purchase interest time frame ____________

Publication ad appeared in ____________

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SYMPHONY MACROS

TRANSLATING 'A PAUPER'S NOTEPAD'

The March @WORK model didn't work in *Symphony*...until now.

BY NICK DELONAS

Several of you wrote to complain that the *1-2-3* annotation macro from "A Pauper's Notepad" won't work in *Symphony*. That isn't surprising, given the differing menus of the two programs. But what may be surprising is how elusive the translation process on that particular model is. The difficulty results from the differences between the Query commands in *1-2-3* and in *Symphony*. Overcoming these differences isn't easy, but you can do it. You just need to examine and, if necessary, convert one operation at a time. We'll show you how.

GENERIC TRANSLATIONS FROM 1-2-3 TO SYMPHONY

Before discussing the @WORK annotation model, let's consider the task of translating any macro from *1-2-3* to *Symphony*. Fortunately, many will work as they are, and you can often translate those that don't without much difficulty. If you're familiar with both products, you can convert macros yourself, line by line. If you're not familiar with both products, a *Symphony* add-in called *Lotus Development Corporation's Macro Conversion Aid* (*MCA*) can help with the job.

Lotus created *MCA* to convert *1-2-3* Release 1A macros into equivalent *Symphony* macros. It works reasonably well, even on models created in later releases of *1-2-3*. The *MCA* add-in is available on CompuServe's World of Lotus, or you can order it from Lotus Customer Services for a small fee.

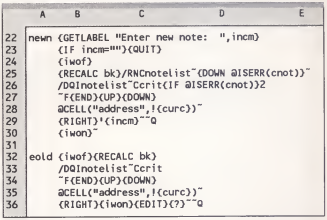
If you have the *MCA* add-in, it provides a convenient place to start when you want to translate a *1-2-3* macro. To use *MCA*, the file SYMPHONY.DYN must be in the same directory as the file SYMPHONY.EXE, or it must be in the DOS search path.

To load *MCA*, press SERVICES, select Application Attach, and specify MCA.APP. To run the utility, select Invoke and choose MCA. Next, highlight the range containing the *1-2-3* macros, and *MCA* will convert them.

BEYOND MCA AND SIMPLE CONVERSIONS

MCA isn't a panacea. Some *1-2-3* macros can't be translated easily. For example, *1-2-3*'s Range Input command does not have a *Symphony* equivalent. And the Query commands of the two programs have subtle, but significant, differences.

Two macro routines in the model described in "A Pauper's Notepad" are particularly difficult to translate. The following figure shows these *1-2-3* routines:



```
        A    B           C                 D              E

22  newn {GETLABEL "Enter new note:  ",incm}
23       {IF incm=""}{QUIT}
24       {iwof}
25       {RECALC bk}/RNCnotelist~{DOWN @ISERR(cnot)}~
26       /DQInotelist~Ccrit{IF @ISERR(cnot)}2
27       ~F{END}{UP}{DOWN}
28       @CELL("address",!{curc})~
29       {RIGHT}'{incm}~~Q
30       {iwon}~
31
32  eold {iwof}{RECALC bk}
33       /DQInotelist~Ccrit
34       ~F{END}{UP}{DOWN}
35       @CELL("address",!{curc})~
36       {RIGHT}{iwon}{EDIT}{?}~~Q
```

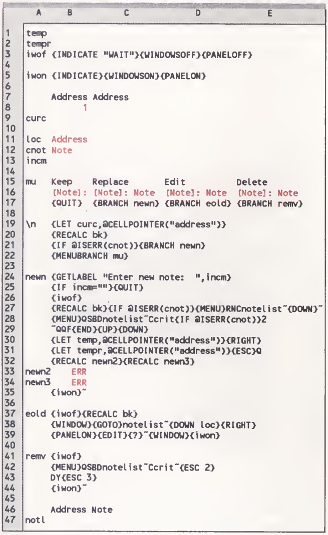
These macros are hard to translate because both use *1-2-3*'s Data Query Find command to edit information in the database with the range name *notelist*. Unlike its *1-2-3* counterpart, *Symphony*'s Query Find command doesn't let you edit data. So you need to think of another way to accomplish the same task.

In the routine named *newn*, the macro copies cells within a Data Query Find command. In the routine named *eold*, the macro copies information and pauses for you to edit data within the Data Query Find command.

We used two different approaches to solve the problems in each macro. The first approach, for *newn*, starts with a Query Find command to locate a particular record. Next, a {LET} command stores in named cells the cell addresses of each field in the record. Then the macro exits the Query Find command. Finally, the macro copies information to the cells identified by those addresses stored in the named cells.

The second approach, for *eold*, makes use of *Symphony*'s windowing capabilities. The macro switches to a second window and moves the cell pointer to the record in question. It pauses to let you edit the record and then switches to the previous window, bringing the cell pointer back to its original location.

The following figure shows the macro for the *Symphony*-notepad model:



```
      A    B           C             D              E
1   temp
2   tempr
3   iwof {INDICATE "WAIT"}{WINDOWSOFF}{PANELOFF}
4
5   iwon {INDICATE}{WINDOWSON}{PANELON}
6
7        Address Address
8              1
9   curc
10
11  loc  Address
12  cnot Note
13  incm
14
15  mu   Keep    Replace       Edit          Delete
16       [Note]: [Note]: Note  [Note]: Note  [Note]: Note
17       {QUIT}  {BRANCH newn} {BRANCH eold} {BRANCH remv}
18
19  \n   {LET curc,@CELLPOINTER("address")}
20       {RECALC bk}
21       {IF @ISERR(cnot)}{BRANCH newn}
22       {MENUBRANCH mu}
23
24  newn {GETLABEL "Enter new note:  ",incm}
25       {IF incm=""}{QUIT}
26       {iwof}
27       {RECALC bk}{IF @ISERR(cnot)}{MENU}RNCnotelist~{DOWN}~
28       {MENU}QSBDnotelist~Ccrit{IF @ISERR(cnot)}2
29       ~QQF{END}{UP}{DOWN}
30       {LET temp,@CELLPOINTER("address")}{RIGHT}
31       {LET tempr,@CELLPOINTER("address")}{ESC}Q
32       {RECALC newn2}{RECALC newn3}
33  newn2    ERR
34  newn3    ERR
35       {iwon}~
36
37  eold {iwof}{RECALC bk}
38       {WINDOW}{GOTO}notelist~{DOWN loc}{RIGHT}
39       {PANELON}{EDIT}{?}~{WINDOW}{iwon}
40
41  remv {iwof}
42       {MENU}QSBDnotelist~Ccrit~{ESC 2}
43       DY{ESC 3}
44       {iwon}~
45
46       Address Note
47  notl
```

Press the MENU key and select Width Set to set the column widths in a blank worksheet as follows:

Column	Width
A	6
B	8
C	14
D	14
E	14

Build the model by entering the labels shown in the figure. Omit, for now, the text printed in red. We'll enter these in a moment. Note that the label entries in rows 7 and 46 are in separate cells in columns B and C.

Use the Range Name Labels Right command to assign the labels in range A1..A47 as range names for the adjacent cells in column B. Then use the Range Name Create command to assign range names to the following ranges:

Name	Range
bk	B7..E16
crit	B7..B8
crit2	C7..C8
notelist	B46..C46

Enter the following formulas in the cells indicated:

Cell	Formula
B8	+notl=$curc
B11	@VLOOKUP(curc,notelist,0)
B12	@VLOOKUP(curc,notelist,1)
B16	+“[Note]: ”&$cnot
B33	+“{LET ”&temp&“,”“”&curc&“”“}”
B34	+“{LET ”&tempr&“,”“”&incm&“”“}”

Copy cell B16 to range C16..E16.

Finally, select SERVICES Window Create and enter *note*. Select SHEET, press Return in order to accept the default window area, and then select Quit. Now press the WINDOW key.

To run the macro, hold down the MACRO key (Alt on most computers) and press N. The macro prompts you to enter a note, which can be as long as 80 characters. Enter *This is a note*. Leave the cell pointer in the same cell and press MACRO-N again. This time the macro displays the note you just entered in the control panel. It also displays a menu of options. You can keep the note, replace it, edit it, or delete it. Run the macro four times, each time trying a different menu selection to see how it works.

The *\n* routine requires no translation from the *1-2-3* model. Here's how it works:

{LET curc,@CELLPOINTER(“address”)} enters the current cell's address in the cell named *curc*.

{RECALC bk} recalculates the formulas in the range named *bk*.

{IF @ISERR(cnot)}{BRANCH newn} passes macro control to the routine *newn* if the cell named *cnot* contains ERR.

{MENUBRANCH mu} displays in the control panel the macro menu that starts in the first cell of the range named *mu*. The macro waits for you to select an item from that menu, then it branches to the macro instructions associated with that menu item.

Here's how the routine *newn* works:

{GETLABEL “Enter new note: ”,incm} prompts you to enter a new note and stores your response as a label in the cell named *incm*.

{IF incm=“”}{QUIT} halts macro processing if *incm* contains an empty string. If you press Return without entering a cell annotation when prompted, the macro doesn't run.

{iwof} calls the routine named *iwof*, which displays WAIT as the mode indicator and freezes the screen display.

{RECALC bk}{IF @ISERR(cnot)}{MENU}RNCnotelist ~{DOWN}~ recalculates the formulas in range *bk*. If

WHAT MCA DOES

We put together a partial list of macros that *MCA* converts in some way. You might find this list useful if you're translating a worksheet and you don't have the *MCA* add-in.

Note that *MCA* does not recognize any *1-2-3* commands introduced after Release 1A. If *MCA* finds a *1-2-3* command that it doesn't recognize, the {BRANCH} command, for example, it does not alter it.

***1-2-3* Command**	***MCA* Conversion Results**
/CA1~A2~	{MENU}CA1~A2~
/DFtmp~0~1~100~	{MENU}RFtmp~0~1 ~100~
/DQIdb~I{DOWN}~UQ	{MENU}QSBDdb~{ESC 4} {MENU}QSBD{DOWN}~ {ESC 4}{MENU}QU {ESC 2}{ESC}
/FS~R{ESC}	{SERVICES}FS~y{ESC}
/PPAQ	{SERVICES}PSDPQQ {SERVICES}PAQ{ESC}
/RIA2..D8192~	{**'RI' COMMAND DOESN'T EXIST IN SYMPHONY**} A2..D8192~
/RJG2..G21~	{**'RJ' COMMAND DOESN'T EXIST IN SYMPHONY**}G2..G21~
/RPtmp~	{MENU}RPPtmp~
/RUtmp~	{MENU}RPAtmp~
/WEY	{SERVICES}NY
/WWC	{**'WWC' COMMAND DOESN'T EXIST IN SYMPHONY**}
/WWH	{SERVICES}WPH
/WWU	{**'WWU' COMMAND DOESN'T EXIST IN SYMPHONY**}
/XCtmp~	{tmp}
/XGtmp~	{BRANCH tmp}
/XItmp~	{IF tmp}
/XLName: ~tmp~	{GETLABEL "Name: ",tmp}
/XMtmp~	{MENUBRANCH tmp}
/XNAmt: ~tmp~	{GETNUMBER "Amt: ",tmp}
/XQ	{QUIT}
/XR	{RETURN}
{GRAPH}	{MENU}GPQ{ESC}
{NAME}	{MENU}
{QUERY}	{**'QUERY' KEY DOESN'T EXIST IN SYMPHONY**}
{TABLE}	{**'TABLE' KEY DOESN'T EXIST IN SYMPHONY**}

the cell named *cnot* contains ERR, the macro issues a Range Name Create command to expand the range named *notelist* down one row. We improved the original *1-2-3* command by checking for ERR in *cnot* before issuing the Range Name Create command. This speeds performance.

{MENU}QSBDnotelist~Ccrit{IF @ISERR(cnot)}2 issues a Query Settings Basic command and assigns *notelist* as the Database range and *crit* or *crit2* as the Criterion range. The macro uses *crit2* as the Criterion range if *cnot* contains ERR. Otherwise the macro uses *crit*.

~QQF{END}{UP}{DOWN} finishes what the previous line started. Since the Criterion range varies depending on whether or not *cnot* contains ERR, the command assigning the Criterion range spans two lines of macro code. Whether the Criterion range is *crit* or *crit2*, the macro actually enters the range name in this line of macro code. The macro then issues a Query Find command and presses the End, UpArrow, and DownArrow keys.

{LET temp,@CELLPOINTER("address")}{RIGHT} enters the current cell's address in *temp*. The macro then moves the cell pointer one cell to the right.

{LET tempr,@CELLPOINTER("address")}{ESC}Q enters the current cell's address in *tempr*. The macro then presses the Escape key and Q to return to *Symphony*'s Ready mode.

{RECALC newn2}{RECALC newn3} recalculates the formulas in the cells named *newn2* and *newn3*.

The string formula in *newn2* takes the form of a {LET} command. It enters the contents of *curc* in the cell identified by the address in *temp*.

The string formula in *newn3* also takes the form of a {LET} command. It enters the contents of *incm* in the cell identified by the address in *tempr*.

{iwon}~ calls the routine *iwon*, which resets the mode indicator and restores normal updating of the screen display. The tilde causes the screen to be updated.

You've probably realized that there are other ways to accomplish the tasks performed by the routine *newn*. You may even think of a faster method that uses the @INDEX function with the {PUT} command. The point is that when a *1-2-3* macro can't be translated easily, you have to determine what it's doing. Once you understand the macro's task, you can determine how to use the *Symphony* environment to accomplish the same task.

The translation of the routine *eold* shows a very different approach to a similar translation problem. Instead of using extra range names and string formulas, this alternate approach uses a second *Symphony* window. Here's how it works:

{iwof}{RECALC bk} calls the routine *iwof* to freeze the screen. The macro then recalculates the formulas in the range named *bk*.

{WINDOW}{GOTO}notelist~{DOWN loc}{RIGHT} presses the WINDOW key and moves the cell pointer to the range named *notelist*. The macro then moves the cell pointer down as many cells as the value in *loc*. Then the macro moves the cell pointer one cell to the right. If you use this macro in a template that has range-restricted windows, you might have to modify this command to call up a specific window. For example, you could replace the {WINDOW} command with {SERVICES}WUnote~.

{PANELON}{EDIT}{?}~{WINDOW}{iwon} cancels the previous {PANELOFF} command to allow updating of the control panel and status line. The macro then puts *Symphony* in Edit mode and pauses for you to edit the current cell. When you press Return, the macro enters your edited note in the current cell, presses the WINDOW key, and calls the routine *iwon*. The routine *iwon* resets the mode indicator and restores normal updating of the screen display. Again, you may want to replace the {WINDOW} command with a call to a specific window.

Here's how the routine *remv* works:

{iwof} runs the routine *iwof*.

{MENU}QSBDnotelist~Ccrit~{ESC 2} issues a Query Settings Basic command and assigns *notelist* as the Database range and *crit* as the Criterion range. The macro then presses the Escape key twice to return to the Query menu.

DY{ESC 3} selects Delete Yes to erase records that match the criterion from the Database range called *notelist*. The macro then returns *Symphony* to Ready mode.

{iwon}~ runs the routine *iwon* and updates the screen.

MACRO LETTERS

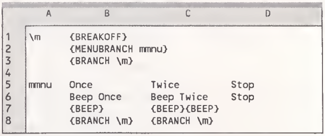
MACRO FORTRESSES

My *Symphony* Release 2.0 templates usually include an autoexecuting macro that uses the {MENUBRANCH} command to display a menu. I use the {BREAKOFF} and {ONERROR} commands, but it's still possible to crash my macros by repeatedly pressing the Escape key. This is disastrous because most of my users are *Symphony* neophytes who are lost without menus to guide them. How can I make my macros crashproof?

R. P. Leftwich
AT&T Technologies
Greensboro, N.C.

The editor replies: You can create templates with macros that retain control regardless of what combination of keys a user presses (unless the user presses Control-Alt-Delete or the system-reset button). However, the macro hasn't been written that locks out an experienced spreadsheet user. So if you're looking for a way to completely hide your macro code, I'm afraid you're out of luck.

If all you want to do is keep users from crashing your macros in normal use, *Symphony* provides all the tools you need. An upcoming article will deal with this subject in depth. For now, correct your problem by entering a {BRANCH} command in the cell that follows each of your {MENUBRANCH} commands. If a user presses the Escape key in response to a macro's menu, processing continues with the command that follows the {MENUBRANCH} command that generated the menu. To see how this works, create the following macro:



	A	B	C	D
1	\m	{BREAKOFF}		
2		{MENUBRANCH mmnu}		
3		{BRANCH \m}		
4				
5	mmnu	Once	Twice	Stop
6		Beep Once	Beep Twice	Stop
7		{BEEP}	{BEEP}{BEEP}	
8		{BRANCH \m}	{BRANCH \m}	

Start in a blank worksheet and use the MENU Settings Width command to adjust the default column width to 14 (we've adjusted column widths differently in the illustration for display purposes). Then enter labels as shown. Use the Range Name Labels Right command to assign the labels in column A as names for the adjacent cells in column B.

Run the macro by holding down the MACRO key (Alt on most computers) and pressing M. When you press the Escape key in response to the macro's menu, control passes to the command in cell B3. That command in turn passes control back to the {MENUBRANCH} command, and *Symphony* redisplays the menu. Select Stop to stop the macro.

FORMULA FOR DAY OF THE WEEK

I use a macro that automatically enters the current date in cell A1. Is it possible to create a formula or a macro that will display the day of the week in cell B1?

G Charlebois
Canadian National
Moncton, New Brunswick

The editor replies: Entering the following formula in cell B1 will do the trick:

```
@CHOOSE(@MOD(A1,7),"Saturday","Sunday",
  "Monday","Tuesday","Wednesday",
  "Thursday","Friday")
```

Send Us Your Macros

If you have questions about macros, send them to us. If you have a favorite macro technique, we'd like to see it. If we use your letter in a column, we'll send you $25. Write to: Macros Editor, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123.*

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MACRO BASICS

AN EASY WAY TO ADD

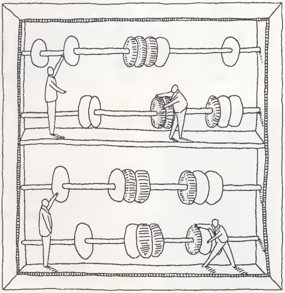
Your first macro can help you write formulas that sum values.

BY DANIEL GASTEIGER

One of the first @functions you learn to use in *1-2-3* and *Symphony* is the @SUM function. It seems appropriate, then, to use this function in an introduction to writing macros.

Macros are recordings of the keys that you would press to accomplish a task in the worksheet. Once you've recorded the keystrokes, you can "play them back" by pressing only two keys.

Macros are particularly useful for people who repeatedly perform a single task in *1-2-3* or *Symphony*. If the task requires you to press 10 keys in succession, move the cell pointer, then press the same 10 keys in succession, chances are your life will be easier if you record the keystrokes in a macro.



To record keystrokes in a macro, simply enter the characters as labels in the worksheet. To see how this works, record the keys that you'd press to type the word *Subtotal*: Move the cell pointer to cell B1, type *Subtotal*, and press Return.

Recording the keystrokes that make up a procedure is the difficult part of creating a macro. You must also assign a range name to the cell that contains the keystroke recording. In this case, assign the name *\s* to the macro cell B1: Press slash and select Range Name Create (in *Symphony* press MENU and select Range Name Create), enter *\s*, then indicate cell B1. You've just created a macro!

To try the macro, move the cell pointer to a blank cell—cell B3 will do—hold down the MACRO key (Alt on most computers), and press S. The word *Subtotal* instantly appears on the edit line of the control panel. You can then enter the word into cell B3 by pressing Return.

A macro can do more than merely type the characters that you can type. A macro can "press" any of the keys that you can press. For example, suppose you wish your macro to enter the word *Subtotal* in the current cell rather than just type it on the edit line.

To make this happen, you use one of a set of special macro instructions called key indicators. A key indicator represents a key on your keyboard that produces an effect rather than a visible character. The cursor-movement keys cause the cell pointer to move around the spreadsheet, but they leave no visible characters. Likewise, the Return key enters information into cells and makes menu selections, but there is no specific character that you associate with it.

The macro key indicator for the Return key is the tilde (~). In a sequence of keystrokes, at any point when you would press Return, you enter the tilde macro instruction. So, to write a macro that enters the word *Subtotal* into the current cell, you enter the label *Subtotal~* into a cell, and assign it a macro name.

Try it. Move the cell pointer back to cell B1 and press the EDIT key. Then type a tilde and press Return. Now move the cell pointer to cell B4, hold down the MACRO key, and press S. The word *Subtotal* appears in the current cell.

There are key indicators for almost every key on your keyboard. The indicator for the Return key is a single character because you use it so often. Each of the other key indicators consists of a keyword enclosed in braces. For example, the keyword for the DownArrow key is {DOWN}, and the keyword for the WINDOW key is {WINDOW}. There is a complete list of the special key indicators in your software's documentation.

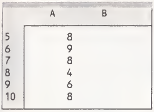
Recording and replaying cell entries can save a little

Daniel Gasteiger is a contributing editor to LOTUS *and president of the software firm Tenet Educational.*

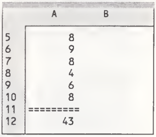
time if there are words that you use often in your spreadsheets. However, by exercising some of the macro key indicators, your macros can completely replace you at the keyboard for many repetitive tasks.

A REAL-LIFE APPLICATION

One common worksheet chore is that of summing columns of numbers. You might enter several values in succession, then wish to total them, with the appropriate dividing line separating the numbers from the total. The figure on the left below shows a column of values; the figure on the right shows the summed entries.

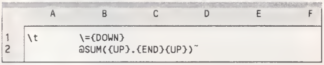


```
          A          B
 5        8
 6        9
 7        8
 8        4
 9        6
10        8
```



```
          A          B
 5        8
 6        9
 7        8
 8        4
 9        6
10        8
11  =========
12       43
```

If you ever need to sum columns of data as you enter them, try using the macro shown here:



```
        A          B          C          D          E          F
1   \t         \={DOWN}
2              @SUM({UP}.{END}{UP})~
```

To create the macro, start in a blank worksheet. In *1-2-3* select /Worksheet Erase Yes. In *Symphony* select SERVICES New Yes. Enter the labels exactly as shown. You'll need to begin each of the entries by typing an apostrophe label-prefix character, or your entries won't look like ours.

Once you've entered the labels, assign the macro name \t to cell B1. To do this easily, place the cell pointer in cell A1, select /Range Name Labels Right (in *Symphony*, MENU Range Name Labels Right), and press Return. This assigns the label in cell A1 as the range name for cell B1. The label in cell A1 is not part of the macro; it serves only to help you name the macro and to identify the macro's name when you look at the worksheet.

Now put the macro to use. Enter the numbers shown in range A5..A10 of the figure. Then move the pointer to cell A11. Hold down the MACRO key and press T. In a flash, the macro enters a double line and sums the values in the column. Here's how it works:

\={DOWN} types a backslash and an equal sign, then presses the DownArrow key. The backslash is the label prefix that causes a character to repeat throughout the width of a cell. The equal sign is the character that the cell is filled with. The {DOWN} command enters \= into the cell and moves the cell pointer to the next cell in the column.

@SUM({UP}.{END}{UP})~ begins entering an @SUM formula by typing *@SUM(*. Then the {UP} command moves the cell pointer up one cell in the column. The period anchors the cell pointer, and the commands {END}{UP} expand the cell pointer to include all contiguous entries above the cell containing the double line. The right parenthesis completes the formula, and the tilde enters the formula into the current cell.

MACRO NAMES

Lotus Development Corp.'s *1-2-3* Releases 1A, 2, and 2.01 let you assign only 26 macro names. Each name must consist of a backslash (\\) followed by a single letter. You "replay" a macro by holding down the MACRO key (Alt on most computers) and pressing the letter of the macro's name.

You can assign a 27th macro name, \0. This doesn't let you trigger its associated macro from within the worksheet. However, when you retrieve a worksheet that contains a macro named \0, that macro starts running automatically.

Symphony, from its first release, has allowed the same 26 macro names that *1-2-3* allows. *Symphony* also contains the USER key, which lets you trigger a macro no matter what name you've given it. For example, to start a macro named *addit* in *Symphony*, you press the USER key, type the word *addit*, then press Return.

Unlike *1-2-3*, *Symphony* doesn't recognize \0 as the name for a macro to run automatically upon retrieving a worksheet. Rather, you can use the SERVICES Settings Auto-Execute Set command in any worksheet to assign a cell or range name as the macro to run automatically.

1-2-3 Releases 2.2 and 3 have a RUN key similar to *Symphony*'s USER key. *1-2-3* prompts you to select a macro to run. You can enter a range name, select a name from the list that appears in the control panel, enter a cell address, or press Escape and point to the cell that contains the macro you wish to run.

The macro presses keys that you might press yourself. The {END} keyword represents the End key, and the {UP} keyword represents the UpArrow key. Many of the macros you might use regularly consist of no more than such familiar spreadsheet commands.

ON YOUR OWN

You can use this rather simple macro in just about every spreadsheet you create. If you ever need to sum a list of numbers in a hurry, simply position the cell pointer beneath the last of the numbers and run the macro.

But don't stop with this exercise. Experiment on your own with the list of key indicators in your software's documentation. Also, continue to try the exercises in this column. If Macro Basics isn't challenging enough, push ahead with a *1-2-3* or *Symphony* Macros column. Many of the topics in those articles are appropriate for people who are just starting with macros. ■

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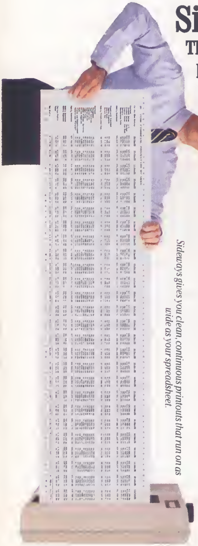

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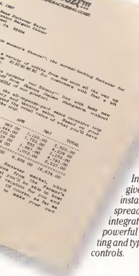

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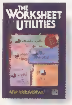
Formula Editor provides a powerful environment for entering, editing, and debugging formulas, with point/shoot menus for @functions, prompting for arguments, and an on-line @function reference manual.



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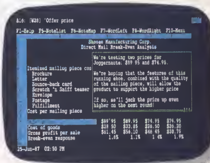
Noteworthy.

The software that remembers. So you don't have to.

Noteworthy™ is the professional cell-annotation and documentation software that lets you tell the story behind the numbers, formulas and macros in your spreadsheet.



```
A16: [W28] 'Offer price
F1-Help  F5-NoteList  F6-NoteMap  F7-WordLeft  F8-WordRight  F10-Menu
                     Shooee Manufacturing Corp.
                  Direct Mail Break-Even Analysis
                           We're testing two prices for
                           Joggernauts: $89 95 and $74.95.
Itemized mailing piece cos
  Brochure                 We're hoping that the features of this
  Letter                   running shoe, combined with the quality
  Bounce-back card         of the mailing piece, will allow the
  Scratch 'n Sniff teaser  product to support the higher price
  Envelope
  Postage                  If so, we'll jack the price up even
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Break-even response           1.6%     1.1%     1 4%     1.9%
25-Jun-87  02:50 PM
```

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WHAT YOU OWE

THE PERSONAL INCOME-TAX ESTIMATOR

Find out what your 1989 tax bill is going to be.

BY STEPHEN L. NELSON
WITH STEVEN R. SOGGE

Each year about this time many of us begin a paper chase, searching for bank records, charge-account statements, and expense receipts in an attempt to calculate what we owe in income tax. The search usually culminates in a frenzy of income tax preparation in April.

Over the course of the year, we often ask ourselves questions that are related to our taxes. How much income tax will I be able to save by making an IRA contribution? Does it make sense for me to save receipts so that I can itemize next year? Would that deduction for home-mortgage interest really produce significant tax savings?

> **The worksheet uses tax-rate schedules instead of tables, so setting it up is a snap.**

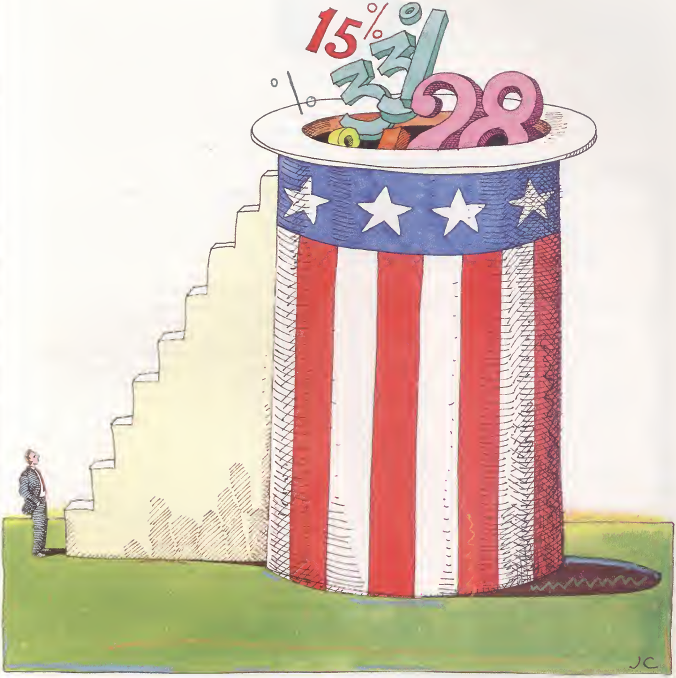
The tax-analyzer worksheet described in this article calculates your current income tax bill and answers your questions about future tax strategies. It uses the 1989 tax-rate schedules, personal-exemption allowances, and deduction amounts. And barring another major change in the tax laws, it will serve you well in future years if you update a few values.

The tax analyzer is a general-purpose tool you can use for most personal income tax situations. It bases its calculations on tax-rate schedules rather than on tax tables. This makes building it a snap because you do not have to enter lengthy tables in the worksheet. If your income is less than $50,000, however, you may notice a slight difference in the tax amount calculated by the worksheet compared with the tax amount taken from tax tables. Rounding the amounts in the tax tables is the source of the problem. The difference in the tax is usually less than $5.

In addition, there are two special-case filing situations for which worksheet procedures must be modified: if you or your spouse is over 65 or is blind, and if you are claimed as a dependent by someone else. In each case, you must determine your standard deduction manually and enter it in the worksheet. The reason is that there are a host of variables involved in these calculations. The elaborate formulas required to handle these situations would make the worksheet unnecessarily complex. More on this later.

The tax-analyzer worksheet works in all versions of *1-2-3* and *Symphony*. To construct the model, follow the setup instructions in the box on page 55. Once you build the analyzer, follow the steps outlined in this article to estimate your income tax.

Stephen L. Nelson, CPA, is a LOTUS *contributing editor and a consultant in Seattle, Wash. Steven R Sogge, CPA, is a senior financial analyst for Met Life Capital Corp. in Bellevue, Wash.*



THE NINE STEPS

The worksheet calculates your income tax in nine steps. Some of the steps require you to enter data. Other steps are performed by the worksheet. Each step is important, and determining your filing status is where you begin.

STEP 1: DETERMINE YOUR FILING STATUS.

In general, your filing status depends on whether you're married and whether you have dependents. You fall into one of the following five categories:

1. If you're unmarried and have no dependents, your filing status is single.

2. If you're married and file a combined return with your spouse, your filing status is married filing a joint return.

3. If you're married and you and your spouse file individual returns, your filing status is married filing a separate return.

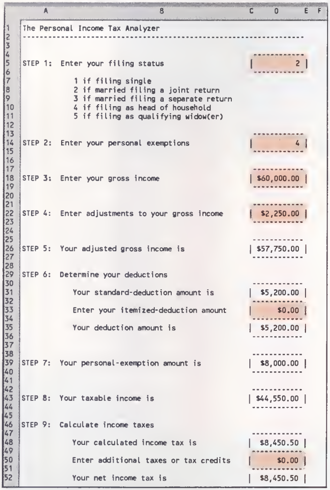
4. If you're unmarried and pay more than half the cost of maintaining a home for a qualifying relative, such as a child or a grandchild, your filing status is head of household.

5. If you're a widow or widower whose spouse died during the two years prior to 1989, and if you have a

JOSEPH CIARDIELLO

dependent child, your filing status is qualifying widow or widower. When a spouse dies during the current year, the filing status remains married joint or married separate.

Indicate your filing status by entering the appropriate number between 1 and 5 in cell D5 of the worksheet in figure 1. In the example a 2 appears in cell D5, so the filing status is married filing a joint return.



```
         A                          B                            C       D       E  F
 1  The Personal Income Tax Analyzer
 2  --------------------------------------------------------------
 3
 4                                                             ------------
 5  STEP 1:  Enter your filing status                          |         2 |
 6                                                             ------------
 7               1 if filing single
 8               2 if married filing a joint return
 9               3 if married filing a separate return
10               4 if filing as head of household
11               5 if filing as qualifying widow(er)
12
13                                                             ------------
14  STEP 2:  Enter your personal exemptions                    |         4 |
15                                                             ------------
16
17                                                             ------------
18  STEP 3:  Enter your gross income                           | $60,000.00 |
19                                                             ------------
20
21                                                             ------------
22  STEP 4:  Enter adjustments to your gross income            |  $2,250.00 |
23                                                             ------------
24
25                                                             ------------
26  STEP 5:  Your adjusted gross income is                     | $57,750.00 |
27                                                             ------------
28
29  STEP 6:  Determine your deductions
30                                                             ------------
31               Your standard-deduction amount is             |  $5,200.00 |
32                                                             ------------
33               Enter your itemized-deduction amount          |      $0.00 |
34                                                             ------------
35               Your deduction amount is                      |  $5,200.00 |
36                                                             ------------
37
38                                                             ------------
39  STEP 7:  Your personal-exemption amount is                 |  $8,000.00 |
40                                                             ------------
41
42                                                             ------------
43  STEP 8:  Your taxable income is                            | $44,550.00 |
44                                                             ------------
45
46  STEP 9:  Calculate income taxes
47                                                             ------------
48               Your calculated income tax is                 |  $8,450.50 |
49                                                             ------------
50               Enter additional taxes or tax credits         |      $0.00 |
51                                                             ------------
52               Your net income tax is                        |  $8,450.50 |
```

FIGURE 1. This tax-analysis worksheet calculates net personal income tax by using tax-rate schedules rather than lengthy tax tables. You enter the filing status, personal exemptions, gross income, and income adjustments. Formulas and lookup functions return adjusted gross income, the standard deduction, personal exemptions, taxable income, and net income tax. The shaded areas are input cells.

STEP 2: TALLY YOUR PERSONAL EXEMPTIONS.

You are entitled to one exemption for yourself, one for your spouse if you're filing a joint return, and one for each of your dependents. However, if you're claimed as a dependent on someone else's return, you don't get an exemption for yourself.

To claim someone as a dependent, the dependent must meet the following five criteria:

- have gross income less than the exemption amount
- have been supported more than 50% by you
- be a member of your household or family
- be a U.S. citizen or a resident of the United States, Canada, or Mexico
- not file a joint return

Using these criteria, determine the number of personal exemptions you're entitled to, and enter that number in cell D14. The example shows four personal exemptions. This represents an exemption for the taxpayer and the taxpayer's spouse and two dependent children.

STEP 3: REPORT YOUR INCOME.

Unless the law specifically states otherwise, all income is taxable and needs to be reported. Income includes wages, tips, and other employee compensation; interest and dividends; alimony payments received; commissions; and bonuses.

Determine your total income for 1989 and enter it in cell D18. In the example a total income of $60,000 appears in this cell.

STEP 4: ENTER ADJUSTMENTS TO INCOME.

You can make several possible adjustments to your total income. The most common is the purchase of an individual retirement account (IRA). Other adjustments include alimony payments you made, early withdrawal penalties on savings certificates, and contributions to pension plans, such as Keogh plans, for those who are self-employed.

The example shows an adjustment amount of $2,250 in cell D22, which represents the purchase of an IRA. Determine the adjustments to which you are entitled, and enter the adjustment amount in cell D22.

STEP 5: COMPUTE YOUR ADJUSTED GROSS INCOME.

The worksheet performs this step for you by subtracting the income-adjustment amount entered in cell D22 from the total-income amount in cell D18. The result is the adjusted gross income, which serves as the basis for calculations that determine the percentages of expenses and itemized deductions to which you are entitled.

STEP 6: DETERMINE YOUR DEDUCTIONS.

The worksheet performs this step too. It uses a formula to identify the standard-deduction amount you're entitled to. It then compares that amount to the itemized-deduction amount, if any, entered in cell D33. It selects the larger of the two amounts as your deduction amount.

The worksheet determines your standard deduction by using a vertical lookup function. Range J7..K11 of figure 2 contains the standard-deduction amounts used for the five filing statuses. The first filing status, single, has the standard-deduction amount of $3,100. The second, married joint, has the standard-deduction amount of $5,200.

The formula in cell D31 uses the @VLOOKUP function to search through the range named *deduct_sch* (J7..K11). The filing status in cell D5 is the lookup value. When the @VLOOKUP function finds the cell that has the filing status equal to the number you entered in cell D5, it moves one column to the right and returns the value in that column as the standard-deduction amount.

For example, the @VLOOKUP function in cell D31 uses the filing status 2 as the lookup value, range J7..K11 as the lookup table range, and 1 as the column offset. When the function locates the lookup value in cell J8, it moves one column to the right and returns the value $5,200 as the standard-deduction amount.

As mentioned earlier, there are two situations in which the standard-deduction amount calculated by the worksheet isn't correct. This general-purpose worksheet does not incorporate the complex, special-case formulas necessary to cover them.

For example, if you or your spouse is over 65 years of age or is blind, you are entitled to a higher deduction than that indicated by the worksheet. If either of these conditions apply, you should follow the guidelines in the IRS 1040 Form and Instructions booklet to determine your standard deduction. Then enter in cell D31 the appropriate deduction amount.

On the other hand, if you can be claimed as a dependent on someone else's return and earned less than the standard-deduction amount, the deduction amount you are entitled to is $500 or your earned income—whichever is larger. Enter the appropriate value in cell D31.

You enter your total itemized deductions in cell D33. If you know that your itemized deductions won't exceed the standard-deduction amount, enter a zero in cell D33. If you think there's a chance your itemized deductions will exceed the standard-deduction amount, add up your deductions and enter the total in cell D33.

Itemized deductions can include the following: medical and dental expenses that exceed 7.5% of your adjusted gross income in cell D26, state and local income taxes, real estate taxes, personal-property taxes, deductible home-mortgage and personal interest, charitable contributions, and other income-related expenses to the extent that they exceed 2% of your adjusted gross income.

The @MAX formula in cell D35 returns either the standard-deduction amount in cell D31 or the itemized-deduction amount in cell D33, whichever is larger. To calculate the tax savings you'll get by itemizing rather than by taking the standard deduction, simply figure your taxes both ways and compare the totals.

STEP 7: COMPUTE YOUR PERSONAL-EXEMPTIONS AMOUNT.

In 1989 you are allowed to subtract $2,000 from your adjusted gross income for each personal exemption you claim. The formula in cell D39 multiplies the personal exemptions from cell D14 by the personal-exemption amount in cell K3. Four personal exemptions are claimed in the example, so cell D39 returns $8,000.

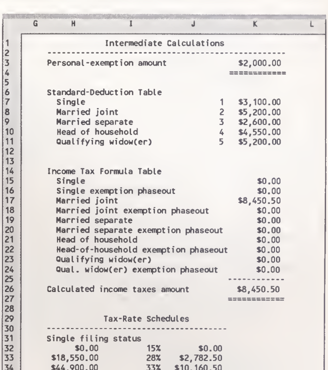
STEP 8: CALCULATE YOUR TAXABLE INCOME.

Your taxable income, the amount on which you actually pay income tax, is calculated in cell D43. The formula in this cell subtracts the deduction amount in cell D35 and the personal-exemption total in cell D39 from the adjusted gross income in cell D26. It then returns either the result of this subtraction or zero, whichever is larger, since taxable income can't be negative.

STEP 9: CALCULATE YOUR INCOME TAX.

The net income tax amount in cell D52 is the income tax you owe based on your taxable income, plus any additional taxes and minus any tax credits.

The calculated income tax amount in cell D48 is derived from the formulas in the table of income tax formulas. That table is in range H14..K24 of figure 2. A pair of formulas exists in the table for each filing status. @IF



```
       G       H             I              J              K            L
 1                     Intermediate Calculations
 2          ------------------------------------------------
 3          Personal-exemption amount                  $2,000.00
 4                                                   ============
 5
 6          Standard-Deduction Table
 7            Single                          1   $3,100.00
 8            Married joint                   2   $5,200.00
 9            Married separate                3   $2,600.00
10            Head of household               4   $4,550.00
11            Qualifying widow(er)            5   $5,200.00
12
13
14          Income Tax Formula Table
15            Single                                  $0.00
16            Single exemption phaseout               $0.00
17            Married joint                       $8,450.50
18            Married joint exemption phaseout        $0.00
19            Married separate                        $0.00
20            Married separate exemption phaseout     $0.00
21            Head of household                       $0.00
22            Head-of-household exemption phaseout    $0.00
23            Qualifying widow(er)                    $0.00
24            Qual. widow(er) exemption phaseout      $0.00
25                                                 -----------
26          Calculated income taxes amount        $8,450.50
27                                                ============
28
29                      Tax-Rate Schedules
30          -------------------------------------
31          Single filing status
32                $0.00          15%         $0.00
33           $18,550.00          28%     $2,782.50
34           $44,900.00          33%    $10,160.50
35           $93,130.00          28%    $26,076.40
36
37          Married joint filing status
38                $0.00          15%         $0.00
39           $30,950.00          28%     $4,642.50
40           $74,850.00          33%    $16,934.50
41          $155,320.00          28%    $43,489.60
42
43          Married separate filing status
44                $0.00          15%         $0.00
45           $15,475.00          28%     $2,321.25
46           $37,425.00          33%     $8,467.25
47          $117,895.00          28%    $35,022.35
48
49          Head-of-household filing status
50                $0.00          15%         $0.00
51           $24,850.00          28%     $3,727.50
52           $64,200.00          33%    $14,745.50
53          $128,810.00          28%    $36,066.80
```

FIGURE 2. This area of the tax analyzer contains the formulas and lookup tables that drive tax calculations. The standard deductions are located in range J7..K11. Tax-rate schedules are in range H31..J53. For each tax-rate schedule, a pair of formulas in range K15..K24 calculates net tax.

WHAT YOU OWE

functions that are within the formulas test to determine the filing status. Once that is determined, the @IF functions select from the table a pair of formulas that calculate the tax.

The first formula in each pair calculates total tax when the adjusted income is less than the maximum shown for a filing status. The other formula in the pair comes into play when adjusted income exceeds this maximum. In this case, the results of the two formulas are added together to produce total tax.

In the example the filing status is married filing a joint return, and taxable income is less than the maximum amount in the rate schedule. The total tax is calculated in cell K17. If the adjusted income is larger than the $155,320 maximum for this schedule, the formula in cell K18 calculates the additional tax owed. The values in cells K17 and K18 are added together by the @SUM formula in cell K26 to return the total tax amount.

The pairs of formulas for the five filing statuses work identically. The only difference is that the formulas reference the different tax-rate schedules and filing statuses.

If you've ever done your taxes manually by using tax-rate schedules, you'll see that the worksheet duplicates that process. In the manual procedure, you look in the rate schedule for the largest amount that doesn't exceed your taxable income (the match amount). Then you calculate your tax by adding the dollar amount on that line of the schedule to the tax amount you owe on the difference between your taxable income and the match amount.

The formula in cell K17 mimics this calculation by using three lookup functions. Each function uses the taxable-income amount in cell D43 as the lookup value and the range named *marriedj_sch* (H38..J41) as the Table range. However, the offset argument is different in each function. The first vertical lookup function returns a match amount from the first column of the tax-rate schedule. The second lookup function returns a tax-rate percent from the second column. The third lookup function returns a base-tax amount from the third column.

Here's how these results are used. The match amount returned by the first lookup function is subtracted from the taxable income in cell D43. The difference is multiplied by the percent rate returned by the second lookup function. This yields the amount of tax owed on income exceeding the match amount in the rate schedule. The tax on excess income is then added to the tax on the match amount, which is returned by the third lookup function. The result is total tax owed.

The formula can be expressed as follows:

Calculated income tax = (taxable income −
match amount from rate table) ×
tax rate + tax from rate table

In the example, the calculation looks like this:

(44,550 − 30,950)*28% + 4,642.50

A personal-exemption phaseout applies to high-income taxpayers. The formula in cell K18 and other phaseout formulas in the table perform these calculations.

All of the tax-rate schedules in figure 2 start at 15% and jump successively to 28%, 33%, and back to 28%. What really happens, however, is that if your taxable-income amount exceeds the largest amount shown in a tax-rate schedule, the 33% rate continues in force as a 5% surtax until your exemptions are used up. Then the marginal rate really does revert to 28%.

The surtax is calculated by multiplying 5% by the smaller of two amounts. One amount is represented by the following equation:

number of personal exemptions ×
(2,000 × 28%/5%)

The other amount that can be multiplied by 5% is the larger of either your taxable income minus the largest income amount in the rate schedule or zero.

In essence, the application of the 5% surtax negates the tax savings that results from your exemptions.

If this all seems confusing, you're right. You need to be aware of this only if your taxable income is so high that you move out of the 33% tax bracket and back into the 28% tax bracket. For someone who is married and filing jointly, this occurs at an adjusted gross income of $155,320. The worksheet performs the exemption-phaseout calculation for you and then adds the result to your calculated tax amount.

You enter additional taxes or tax credits in cell D50. Enter additional taxes as positive amounts. Enter tax credits as negative amounts.

Additional taxes might include self-employment tax, social security tax on unreported tip income, capital gains tax, or the alternative minimum tax.

Tax credits are direct, dollar-for-dollar reductions in the amount of tax you pay. The most common tax credit is awarded for child- and dependent-care expenses. Depending on your adjusted gross income, you may be able to take a credit of between 20% and 30% of certain dependent-care expenses, up to a maximum of $2,400. If you provide for the care of more than one person, the maximum rises to $4,800.

SOME SOUND ADVICE

Keep several things in mind as you use the tax analyzer. First, as mentioned earlier, worksheet calculations are based on the tax-rate schedules. Slight differences will exist between worksheet totals and tax-table totals.

Second, you can update the worksheet by changing several values in figure 2. Each year the IRS indexes against inflation the personal-exemption allowance, the deduction amounts, and the tax-rate schedules. In order to update the worksheet for future years, enter a new personal-exemption allowance in cell K3, new standard-deduction amounts in range K7..K11, and new taxable income and tax amounts in the tax-rate schedules in range H32..J53. Revised figures for 1990 will be available from the IRS early in the year.

Third, don't view this article or worksheet as a substitute for official IRS filing instructions or for advice from a competent tax specialist. The accuracy of your tax calculations depends on the accuracy of the data you enter. The best way to be sure your data is accurate is to carefully follow official filing instructions. When that's not enough, seek the advice of a good tax accountant or attorney. ■

HOW TO SET UP THE TAX-ANALYZER WORKSHEET

1. Default settings

Format: Currency 2

1-2-3: /Worksheet Global Format Currency, press Return to accept the default of 2

Symph: MENU Settings Format Currency, press Return to accept the default of 2, select Quit

Column-width: 12

1-2-3: /Worksheet Global Column-Width, enter 12

Symph: MENU Settings Width, enter 12, select Quit

2. Individual column widths

Column	Width	Column	Width
B	41	F	5
C	1	G	5
E	1	J	14

For example, to set the width of column B, place the cell pointer in column B and select

1-2-3: /Worksheet Column Set-Width, enter 41

Symph: MENU Width Set, enter 41

3. Labels

Figure 1: Enter the labels shown in columns A and B of figure 1. Begin each entry in range B7..B11 with an apostrophe. Create the dashed line in row 2 by entering \- in cell A2 and copying cell A2 to range B2..E2.

To create the box around the filing status in cell D5, enter \- in cells D4 and D6 and '| in cells C5 and E5. Copy this box from range C4..E6 to the following cells: C13, C17, C21, C25, C30, C32, C34, C38, C42, C47, C49, and C51. To make it easier to copy this box, assign the range name *box* to range C4..E6. Then specify *box* as the range to copy from.

Enter the label \= in cell D53.

Figure 2: Enter labels shown in rows 1 through 31 and rows 37, 43, and 49. Begin entries in ranges H7..H11 and H15..H24 with two spaces. Enter \- in cell H2. Copy cell H2 to ranges I2..K2 and H30..J30 and to cell K25. Enter \= in cells K4 and K27.

4. Cell formats

Format	Range
General	D5, D14, J7..J11
Percent 0 (*Symph*: %0)	I32..I53

For example, to set the format for cell D5 select

1-2-3: /Range Format General, specify cell D5

Symph: MENU Format General, specify cell D5

5. Values

Enter the values shown in cells D5, D14, D18, D22, D33, and D50 of figure 1. Enter the values shown in cell K3 and in ranges J7..K11, H32..H53, and J32..J53 of figure 2. Enter the values shown in range I32..I35, and copy this range to cells I38, I44, and I50.

6. Range names

Name	Range
deduct_sch	J7..K11
head_sch	H50..J53
marriedj_sch	H38..J41
marrieds_sch	H44..J47
single_sch	H32..J35

For example, to assign the name *deduct_sch*, press slash (*Symph*: MENU), select Range Name Create, enter the name, and indicate range J7..K11.

7. Enter and copy formulas

Cell	Formulas
D26	+D18–D22
D31	@VLOOKUP(D5,*deduct_sch*,1)
D35	@MAX(D31,D33)
D39	+K3*D14
D43	@MAX(D26–D35–D39,0)
D48	+K26
D52	+D48+D50
K15	@IF($D$5=1,(($D$43– @VLOOKUP($D$43,$*single_sch*,0))* @VLOOKUP($D$43,$*single_sch*, 1))+@VLOOKUP($D$43, $*single_sch*,2),0)
K16	@IF($D$5=1,0.05*@MIN($D$14* ($K$3*0.28/0.05), @MAX($D$43–@MAX($*single_sch*), 0)),0)
K26	@SUM(K15..K24)

Copy cells K15..K16 to ranges K17..K18, K19..K20, K21..K22, and K23..K24.

Edit the formulas in cells K17 and K18, as shown below. The only difference is that the @IF test now compares the filing-status entry in cell $D$5 with the number 2, and the @VLOOKUP function uses the range named *marriedj_sch*.

Cell	Formulas
K17	@IF($D$5=2,(($D$43– @VLOOKUP($D$43, $*marriedj_sch*,0))* @VLOOKUP ($D$43, $*marriedj_sch*,1))+@VLOOKUP ($D$43,$*marriedj_sch*,2),0)
K18	@IF($D$5=2,0.05*@MIN($D$14* ($K$3*0.28/0.05),@MAX ($D$43–@MAX ($*marriedj_sch*), 0)),0)

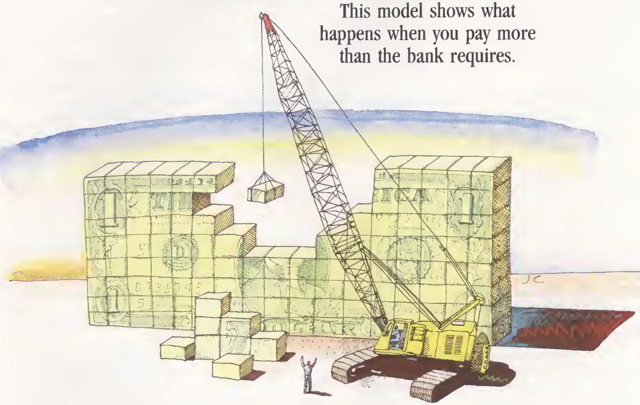
Edit the formulas in cells K19 and K20, K21 and K22, and K23 and K24, as shown below. Note that the qualifying-widow(er) filing status is based on the married joint tax-rate schedule.

Cell	Formulas
K19	@IF($D$5=3,(($D$43– @VLOOKUP($D$43,$*marrieds_sch*,0))* @VLOOKUP ($D$43, $*marrieds_sch*,1))+@VLOOKUP($D$43, $*marrieds_sch*,2),0)
K20	@IF($D$5=3,0.05*@MIN($D$14* ($K$3*0.28/0.05),@MAX ($D$43–@MAX($*marrieds_sch*), 0)),0)
K21	@IF($D$5=4,(($D$43– @VLOOKUP($D$43,$*head_sch*,0))* @VLOOKUP($D$43,$*head_sch*, 1))+@VLOOKUP($D$43,$*head_sch*, 2),0)
K22	@IF($D$5=4,0.05*@MIN($D$14* ($K$3*0.28/0.05),@MAX ($D$43–@MAX($*head_sch*), 0)),0)
K23	@IF($D$5=5,(($D$43– @VLOOKUP($D$43,$*marriedj_sch*,0))* @VLOOKUP($D$43, $*marriedj_sch*,1))+@VLOOKUP ($D$43,$*marriedj_sch*,2),0)
K24	IF($D$5=5,0.05*@MIN($D$14* ($K$3*0.28/0.05),@MAX ($D$43–@MAX($*marriedj_sch*), 0)),0)

WHAT YOU OWE

THE LOAN-STATUS ANALYZER

This model shows what happens when you pay more than the bank requires.



BY STEPHEN L. NELSON

An article of mine, "Track the Payments on Your Loan," appeared in the September 1988 issue of *LOTUS*. It explained how to produce a schedule that shows how much of each payment covers principal and how much covers interest. For accounting purposes, it indicates the amount to post to your outstanding loans, interest, and cash accounts.

Since the article appeared, many of you have written to the magazine asking if the model could be used to determine how much earlier the loan would be paid off if you paid a lump sum toward the principal during the loan's term or increased the amount of the payment for a portion of the term. Instructions for modifying the worksheet were printed in *LOTUS*'s letters pages in January and June. But letters keep coming, so it seems worthwhile to address the topic again.

This article, therefore, presents a spreadsheet that performs the same basic function as the September 1988 model but allows for a variety of extra-payment situations. Figures 1 and 2 show the model in two possible situations. Although only the first 20 rows of the table appear in the figures, the way we've set up the worksheet accommodates loans with as many as 120 periods. Build the model from the instructions in the box on page 59, then read the next sections to see how to work with the spreadsheet.

JOSEPH CIARDIELLO

USING THE PAYMENT-TRACKING MODEL

Once the formulas are set up, simply enter the amount of the loan, the term in number of payments, the interest rate per period, and the required payment. These amounts go in range C7..C10. Placing entries in range F7..F9 is optional. We'll see how to use this range later.

Let's say you own a health spa, and you decide to borrow $5,000 to put in a new hot tub. The bank lends you the money at an annual rate of 12% with monthly payments of $304.91 over the next year and a half. You'd enter 5000 in cell C7. Because payments are monthly, you'd enter 18 in cell C8 and 1% (12% divided by 12) in cell C9. The required payment, 304.91, appears in cell C10.

The *Standard Payment* column of the schedule shows the amount you pay each period. This is the amount you post to your cash account. As you'd expect, $304.91 is repeated in periods 1 to 18. The worksheet displays the same amount redundantly unless you make extra payments on the loan. In that case, the worksheet shows a final payment that is less than the nominal payment.

The *Interest Expense* column shows the portion of each standard payment that goes toward interest. You record this amount on your interest account. The *Standard Principal* column shows the difference between the standard payment and the interest expense. Record this amount on your outstanding-loans account. We'll look at the *Extra Principal* column later. The *Principal Balance* column shows the amount of principal that's still outstanding.

As you use this model, don't confuse the annual percentage rate (APR) quoted by the lending institution with the loan's actual interest rate. Use the actual interest rate in cell C9. The APR accounts for costs added to the loan, such as origination fees, insurance, and so forth.

MAKING EXTRA PAYMENTS

Let's look at the extra-payments section. Suppose you feel you can afford to pay more than $305 each month toward the loan, say an extra $35. By doing so, you save on interest and pay off the loan earlier.

Enter 35 in cell F7. Since you expect to be able to afford the extra amount indefinitely, enter 1 in cell F8 and 18 in cell F9. When you press CALC, your screen should resemble figure 1. The *Extra Principal* column displays $35.00 for periods 1 to 15. After you pay $339.91 ($304.91 plus $35) in period 15, the outstanding balance in the 16th period is $333.35. You'd pay off the loan two months early. In this scenario, you'd record the total payment on your cash account.

Instead of making larger payments on a regular basis, you may wish to make a one-time balloon payment. In this case, make the start and end periods for extra payments the same. Suppose, for example, that the spa gets an unexpected spate of new enrollees just after you make the fifth payment on your loan for the hot tub. As a result, you have $500 that's not needed elsewhere and you decide to put it toward the principal with your sixth loan payment.

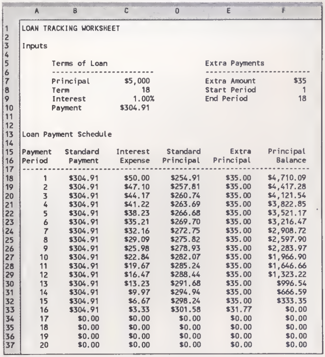
Enter 500, 6, and 6 in range F7..F9 and press CALC. Your screen now resembles figure 2. Cell E23 displays $500.00. After making this payment, you'd record $804.91 instead of $304.91 on your cash account. Notice that you pay off the loan in period 17 with a payment of only $48.97 (cell B34).

You can also test the effect of making extra payments during a limited span of time. Suppose that the spa does slightly better business in the spring, which corresponds to periods 5 through 7 of the loan term. The increase in business means that you will be able to afford to pay an extra $100 on the loan during those months. Enter 100, 5, and 7 in range F7..F9 and press CALC. Cell B34 shows that making the three increased payments means that you could pay off the loan a month early with a final payment of $272.11.

HOW THE FORMULAS WORK

The first formula in the *Standard Payment* column repeats the payment amount in cell C10. The remaining formulas use the @MIN function to return the lesser of either the standard payment amount or the sum of the principal from the previous row and interest from the current row. This way, the schedule never shows a payment greater than the amount you still owe.

The first formula in the *Interest Expense* column multi-



```
       A         B          C          0          E          F
1   LOAN TRACKING WORKSHEET
2
3   Inputs
4
5          Terms of Loan                       Extra Payments
6          -----------------------             ------------------------
7          Principal        $5,000             Extra Amount          $35
8          Term                 18             Start Period            1
9          Interest          1.00%             End Period             18
10         Payment         $304.91
11
12
13  Loan Payment Schedule
14
15  Payment   Standard   Interest   Standard      Extra    Principal
16  Period     Payment    Expense  Principal  Principal      Balance
17  ------------------------------------------------------------------
18        1    $304.91     $50.00    $254.91     $35.00    $4,710.09
19        2    $304.91     $47.10    $257.81     $35.00    $4,417.28
20        3    $304.91     $44.17    $260.74     $35.00    $4,121.54
21        4    $304.91     $41.22    $263.69     $35.00    $3,822.85
22        5    $304.91     $38.23    $266.68     $35.00    $3,521.17
23        6    $304.91     $35.21    $269.70     $35.00    $3,216.47
24        7    $304.91     $32.16    $272.75     $35.00    $2,908.72
25        8    $304.91     $29.09    $275.82     $35.00    $2,597.90
26        9    $304.91     $25.98    $278.93     $35.00    $2,283.97
27       10    $304.91     $22.84    $282.07     $35.00    $1,966.90
28       11    $304.91     $19.67    $285.24     $35.00    $1,646.66
29       12    $304.91     $16.47    $288.44     $35.00    $1,323.22
30       13    $304.91     $13.23    $291.68     $35.00      $996.54
31       14    $304.91      $9.97    $294.94     $35.00      $666.59
32       15    $304.91      $6.67    $298.24     $35.00      $333.35
33       16    $304.91      $3.33    $301.58     $31.77        $0.00
34       17      $0.00      $0.00      $0.00      $0.00        $0.00
35       18      $0.00      $0.00      $0.00      $0.00        $0.00
36       19      $0.00      $0.00      $0.00      $0.00        $0.00
37       20      $0.00      $0.00      $0.00      $0.00        $0.00
```

FIGURE 1. The loan-tracking worksheet tells you how much you're paying towards principal and interest in each payment. This sample worksheet shows what happens if $35 is added to each payment for the duration of the loan, as indicated by the entries in range F7..F9. Because of the extra amount in each payment, the loan is paid off in 16 payments instead of 18.

plies the amount of the loan, in cell C7, by the interest rate, in cell C9. The rest of the formulas in the column multiply the remaining principal (from the previous row of column F) by the interest rate.

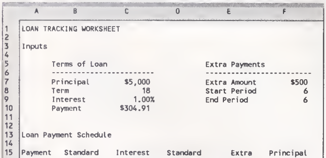
Each formula in the *Standard Principal* column subtracts interest from the standard payment to find the amount that goes toward principal.

Each formula in the *Extra Principal* column uses the @IF function and the #AND# operator to determine if a payment number falls within the total number of standard payments. The range is defined by the start-period and end-period values in cells F8 and F9. If the condition is met, the formula returns whichever is less: the extra payment or the previous principal less the portion of the current standard payment going toward principal. If the condition is not met, the formula returns 0. Using the @MIN function prevents the formulas from returning values greater than the amount you owe.

The first formula in the *Principal Balance* column subtracts the standard principal for the first payment from the entire principal of the loan (cell C7). Then it subtracts any extra principal included in the payment. The remaining formulas in the column do the same thing, except they subtract current principal payments from the previous period's principal balance.

FURTHER CONSIDERATIONS

In the past I've tried to allow for annuity-due loans in this type of article. Annuity due simply means that the first payment is made immediately, before any interest has accrued, and therefore is entirely applied toward the principal. But annuity-due loans are increasingly rare, so I haven't included them in this model. If you do get an annuity-due loan, subtract the payment amount from the principal, enter the result in cell C7, subtract 1 from the number of payments, and enter the result in cell C8.



```
        A         B           C           O           E            F
1   LOAN TRACKING WORKSHEET
2
3   Inputs
4
5            Terms of Loan                        Extra Payments
6            -----------------------              -------------------------
7            Principal       $5,000               Extra Amount         $500
8            Term                18               Start Period            6
9            Interest         1.00%               End Period              6
10           Payment        $304.91
11
12
13  Loan Payment Schedule
14
15  Payment   Standard    Interest    Standard       Extra     Principal
16  Period     Payment     Expense   Principal   Principal       Balance
17  ----------------------------------------------------------------------
18        1    $304.91      $50.00     $254.91       $0.00     $4,745.09
19        2    $304.91      $47.45     $257.46       $0.00     $4,487.63
20        3    $304.91      $44.88     $260.03       $0.00     $4,227.60
21        4    $304.91      $42.28     $262.63       $0.00     $3,964.96
22        5    $304.91      $39.65     $265.26       $0.00     $3,699.70
23        6    $304.91      $37.00     $267.91     $500.00     $2,931.79
24        7    $304.91      $29.32     $275.59       $0.00     $2,656.20
25        8    $304.91      $26.56     $278.35       $0.00     $2,377.85
26        9    $304.91      $23.78     $281.13       $0.00     $2,096.72
27       10    $304.91      $20.97     $283.94       $0.00     $1,812.78
28       11    $304.91      $18.13     $286.78       $0.00     $1,525.99
29       12    $304.91      $15.26     $289.65       $0.00     $1,236.34
30       13    $304.91      $12.36     $292.55       $0.00       $943.80
31       14    $304.91       $9.44     $295.47       $0.00       $648.32
32       15    $304.91       $6.48     $298.43       $0.00       $349.90
33       16    $304.91       $3.50     $301.41       $0.00        $48.49
34       17     $48.97       $0.48      $48.49       $0.00         $0.00
35       18      $0.00       $0.00       $0.00       $0.00         $0.00
36       19      $0.00       $0.00       $0.00       $0.00         $0.00
37       20      $0.00       $0.00       $0.00       $0.00         $0.00
```

FIGURE 2. Here, the worksheet shows what happens if $500 is added to the payment for the sixth period. Note that the formula in cell E23 returns $500, while the other formulas in range E18..E37 return $0.00. Because of the one-time extra payment, the loan is paid off one period early, and the last payment is greatly reduced.

If you take out a loan that requires more than 120 standard payments, you'll need to adjust the model. To make

THE QUICK-AND-DIRTY WAY TO DETERMINE THE TERM OF A LOAN

The bank has just agreed to lend you $5,000 at an annual rate of 12% with monthly payments of $304.91 over the next 18 months. How soon would you pay off the loan if you made payments of $400 or $500 instead?

You can find out quickly, without creating the model described in the article, by "tricking" the @TERM function.

The @TERM function is designed to calculate the number of periods it takes to reach a desired future-value amount by making equal payments to an interest-bearing account. The syntax of the function is usually:

@TERM(*payment*,*interest*,*future_value*)

Used this way, however, @TERM is not suitable for computing the term of a loan. To do that, you would create a formula like this:

@TERM(*payment*,*interest*,*principal**
(1+*interest*)^*term*)

The problem here is that you don't know what value to use in place of *term*—that's what you're trying to figure out. You must write a formula that refers to itself. To find out how long it would take to pay off a $5,000 loan at 1% per month with $400 payments, enter this formula in cell A1 of an empty spreadsheet:

@TERM(400,.01,5000*(1+.01)^A1)

Initially, the formula returns 11.8370974. Also, assuming that the worksheet's recalculation is still set to automatic, the CIRC indicator appears at the bottom of the screen. Press CALC about 10 times. The result of the formula changes each time, but the amount of change is less and less. After the 10th press, the formula returns 13.4197942. It takes about 13½ months to pay off the loan at $400 per month. To test this premise, enter the formula @PMT(5000,.01,A1) in cell A3. This formula returns 400, or something very close to it.

To find the terms for other payment amounts, edit the formula in cell A1, replacing the value 400 with a new payment amount. Then press the CALC key several times. You'll know you've arrived at the correct term amount when cell A3 matches the amount you used for @TERM's first argument.

WHAT YOU OWE

the adjustments, use the Data Fill (in *Symphony*, Range Fill) command to add payment numbers below cell A137. Then copy range B137..F137 to the rows next to the additional payment periods.

Finally, as I noted in the September 1988 article, there may be some discrepancies between your schedule and the lender's. These differences can stem from several factors. One is the exact interest rate per period. The per-period interest rate multiplied by the balance at the beginning of the period gives you the interest per period. The model uses the same rate in all periods. But lenders often calculate, or compound, interest on a daily, or even a continuous, basis. In the examples, we used 1% as the monthly interest rate, but from some lenders' point of view, each month has a different rate because the lengths of the months differ.

Furthermore, the worksheet assumes you make payments at the exact beginning or at the exact end of each period. However, depending on the terms of the debt and the lender's bookkeeping procedures, making a payment a few days before or after the date it is due can substantially affect the interest you pay.

Another difference relates to a debt's outstanding balance. Even if you and the lender agree exactly on the breakdown of payments into principal and interest, you may not agree on the amount required to pay off the loan early. The bank may use a method for calculating interest called the rule of 78s, under which you are charged for interest that, under other methods, would be due in later periods. In effect, this accelerated interest becomes part of the outstanding balance.

Nevertheless, the worksheet's results are close enough to reality to make it a useful tool. Using its results to maintain your company's books would be consistent with acceptable accounting practices. ■

Stephen L. Nelson, CPA, is a contributing editor to LOTUS *and a consultant in Seattle, Wash.*

HOW TO SET UP THE LOAN-STATUS WORKSHEET

1. Default settings

Recalculation: Manual

1-2-3: /Worksheet Global Recalculation Manual
Symph: MENU Settings Recalculation Method Manual Quit

Format: Currency 2

1-2-3: /Worksheet Global Format Currency, press Return
Symph: MENU Settings Format Currency, press Return, select Quit

Column width: 12

1-2-3: /Worksheet Global Column-Width, enter 12
Symph: MENU Settings Width, enter 12, select Quit

2. Individual column widths

Column	Width
A	7
F	13

For example, to set the width of column A, put the cell pointer in column A and select

1-2-3: /Worksheet Column Set-Width, enter 7
Symph: MENU Width Set, enter 7

3. Cell formats

Format	Range
Currency 0	C7..F7
General	C8
Percent 2	C9
General	F8..F9
General	A18..A137

For example, to set the format for range C7..F7, select

1-2-3: /Range Format Currency, enter 0, specify range C7..F7.
Symph: MENU Format Currency, enter 0, specify range C7..F7.

4. Labels

Enter the labels shown in figure 1 in rows 1, 3, 5, 7 through 10, 13, 15, and 16. Right-align range B15..F16. To align these labels, select

1-2-3: /Range Label Right, specify range B15..F16
Symph: MENU Range Label-Alignment Right, specify range B15..F16

Enter a backslash and a hyphen (\-) in cell B6 and copy cell B6 to cell C6 and to ranges E6..F6 and A17..F17.

5. Values

Enter the values shown in range C7..C10 of figure 1. Leave range F7..F9 empty for now. Enter the values 1 through 120 in column A beginning at row 18. To enter these values, select

1-2-3: /Data Fill,
Symph: MENU Range Fill,

Specify range A18..A137 as the fill range, enter 1 as the start value, and press Return twice to accept the default step and stop values.

6. Range names

Use the labels in range B7..B10 to assign names to adjacent cells in column C: Press slash (*Symph*: MENU), select Range Name Labels Right, and specify range B7..B10. Then assign the following additional range names:

Name	Cell
extra	F7
start	F8
end	F9

For example, to assign the name to cell F7, press slash (*Symph:* MENU), select Range Name Create, enter *extra*, and specify cell F7.

7. Formulas

Cell	Formula
B18	+payment
C18	+principal*interest
D18	+B18−C18

Copy cell D18 to cell D19.

Cell	Formula
E18	@IF($start<=A18#AND#$end>=A18,@MIN($extra,principal−D18),0)
F18	+principal−D18−E18
B19	@MIN($payment,F18+C19)
C19	+F18*$interest
E19	@IF($start<=A19#AND#$end>=A19,@MIN($extra,F18−D19),0)
F19	+F18−D19−E19

Copy range B19..F19 to range B20..B137.

The results of the formulas will differ initially from those shown in figure 1.

7 WORKSHEET TIPS

LOTUS's former macros editor reveals his favorite techniques.

BY DANIEL GASTEIGER

I've been using and writing about *1-2-3* and *Symphony* since 1983. Over the years, I've explored every nook and cranny in search of the keys that open doors to new possibilities. Sometimes I'd discover a neat trick on my own. Often I'd hear about someone else's solution to a problem that I hadn't even encountered. And, as unlikely as it might seem, I occasionally found useful techniques hidden in the documentation.

Probably none of the techniques that I consider most useful are original. However, I use these tips almost every time I build a spreadsheet. No matter what your level of spreadsheet expertise, at least one of these will come in handy as you continue to work with *1-2-3* and *Symphony*.

1

CONTROL-PANEL CALCULATOR

A spreadsheet does arithmetic for you. That's one of the first things you learn when you use *1-2-3* or *Symphony*. You probably know how to enter values in cells and how to create formulas that add, subtract, multiply, and divide.

What you might not know is how to do simple math in the spreadsheet. Instead, you resort to calculators. My advice: Save your batteries. Using *1-2-3* or *Symphony*, you can calculate a formula without making a cell entry.

Suppose you want to know the sum of 2,885 and 376 and 1,947, but you don't want to make an entry and recalculate the worksheet. While the mode indicator reads Ready (in *Symphony*, SHEET), type the formula 2885+376 +1947 and press the CALC key. The sum 5208 appears on the edit line of the control panel.

The calculator works even if the current cell is protected and worksheet protection is enabled. Once you know the formula's result, simply press the Escape key to clear it from the display. The worksheet remains unchanged.

You can use this technique to evaluate any formula, even one that includes cell references and @functions. For example, if you want to know what value or label resides in a hidden and protected cell, type a plus sign followed by the cell's address. Then press CALC. This procedure also works with locked cells in *Symphony*. The technique won't reveal an underlying formula, but it will show the current value of the cell.

2

COPY PATTERNS

Sometimes you need to copy an entry from one row to every second row. Or perhaps you need to copy a block of three rows down the worksheet eight times and leave three blank rows after each copy. Whatever the copy pattern, you can use a single Copy command to create it.

To try the technique, start in a blank worksheet and

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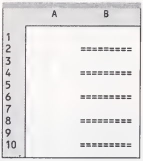
ILLUSTRATIONS BY WARD SCHUMAKER

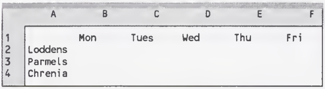
enter a backslash followed by an equal sign (\=) in cell B2. Now press slash (in *Symphony*, press MENU), select Copy, and indicate range B2..B8 as the From range. Copy the dashed line to every other row by indicating cell B4 as the To range. The resulting worksheet appears to the right.



	A	B
1		
2		=========
3		
4		=========
5		
6		=========
7		
8		=========
9		
10		=========

By substituting an appropriate field name for the underline, you can use this technique to generate several identical Criterion ranges. On a grander scale, you can enter the labels that define a table and replicate the table down the worksheet. Then, having created several copies of a single table, you can enter data in each copy.

For example, suppose you create the table shown in the following figure:



	A	B	C	D	E	F
1		Mon	Tues	Wed	Thu	Fri
2	Loddens					
3	Parmels					
4	Chrenia					

You decide that you need to use identical labels for seven more tables that will hold weekly accountings of loddens, parmels, and chrenia. To create the other tables quickly, select /Copy (in *Symphony*, MENU Copy) and indicate range A1..F42 as the From range. Then indicate cell A7 as the To range. Now your worksheet contains eight tables, each separated by two rows.

With a little practice, you'll develop a feel for how many rows to include in the From range in order to obtain the desired number of repeated patterns. You can follow these directions to copy patterns of columns as well, but then you extend the From range to the right rather than down the worksheet.

3

RECALCULATE AS NEEDED

Many of you already know about manual recalculation. For those who don't, learning about it will save you time when you work with large worksheets.

By default, *1-2-3* and *Symphony* recalculate the worksheet every time you make a change to a cell's contents. If you work with small worksheets on high-speed computers, recalculation is so quick that you don't even notice it. When the worksheet is large and contains many formulas, however, recalculation can take a long time.

1-2-3 users can select /Worksheet Global Recalculation Manual to turn off automatic recalculation. *Symphony* users select MENU Settings Recalculation Method Manual Quit in a SHEET window to disable it.

Once you've issued one of those commands, your software won't pause whenever you make a cell entry. You can copy and move cells, insert rows and columns, and assign range names more quickly than you can when recalculation is automatic.

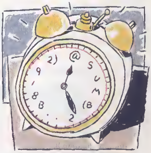
But beware! The CALC indicator appears the moment you make a change in the worksheet. This reminds you that the worksheet's calculations have not accounted for the change. When you change a value on which worksheet formulas rely, those formulas no longer return the correct results.

When you want to observe the worksheet's true calculations, press the CALC key. Your software updates the formulas, and the CALC indicator vanishes. To enable automatic recalculation, select /Worksheet Global Recalculation Automatic in *1-2-3*, or select MENU Settings Recalculation Method Automatic Quit in *Symphony*.

4

LOCAL RECALCULATION

What if you set recalculation to manual, but after entering two or three additional values in a complex worksheet, you notice a few formulas that you wish to update? If you press the CALC key, you know you're in for a wait. But if you can restrict recalculation to a range of only five cells, you can update the formulas in question without waiting for the entire worksheet to recalculate. The question is, how do you recalculate a range?



When you are confident that a formula relies on only a few recently updated values, recalculate the formula by copying it onto itself. To update a range that contains several formulas, copy the range onto itself.

For example, to update formulas in range B8..D8, select /Copy (in *Symphony*, MENU Copy) and indicate range B8..D8 as the From range. Then indicate cell B8 as the To range. Your software recalculates only the formulas in the range, not the entire worksheet.

Be careful when you use this technique. If the formulas you wish to update rely on other formulas that aren't returning their current values, this approach produces erroneous results. Be sure that all formulas involved in a calculation are current before you believe the calculated results. If you aren't sure, press the CALC key and wait.

5

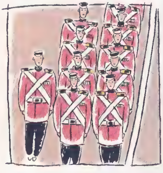
ALIGN LABELS AFTER ENTRY

A label prefix controls the alignment of a label in a cell. If you want a label to appear flush left, simply type the label and press Return. By default, *1-2-3* and

Symphony precede the label with an apostrophe label prefix.

You can override the default by typing a different label prefix before you type the label. For example, to center a label in a cell, type a caret (^), type the label, and press Return. To obtain a flush-right label, type a quotation mark, type the label, and press Return.

Suppose that you need to enter a label in each of 12 adjacent columns. You would like to center the entries, but preceding each one with a caret requires some uncomfortable keyboard gymnastics. My advice: Don't type the carets. Instead, when you wish to enter a series of centered or flush-right labels, enter all the labels as you normally would, leaving them flush left. Then use the label-alignment commands to do the dirty work.



To center existing labels in *1-2-3*, select /Range Label Center and indicate the range containing the labels. In *Symphony*, select MENU Range Label-Alignment Center and indicate the range. If you don't like the results, reissue the command. For example, rather than select Center from the Range Label menu, select Left. The labels again appear flush left.

6 MAKE THE MOST OF MENUS

Making a selection from a menu is easier than typing an instruction. Still, many of us fail to take full advantage of the menus built into *1-2-3* and *Symphony*.

For example, when you select /File Retrieve (in *Symphony*, SERVICES File Retrieve), a list of file names appears in the control panel. You can navigate the list by pressing the cursor-movement keys, such as LeftArrow, RightArrow, PageUp, PageDown, Home, and End keys. But that's not all.

If you use *1-2-3*, after you select /File Retrieve, press the NAME key. If you use *Symphony*, press the MENU key. In either case, your software displays a full-screen list of the files in the current directory. Highlight the one you want to retrieve and press Return.

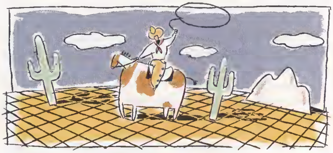
This feature of the NAME and MENU keys also comes in handy if you use range names. Suppose that you wish to move the cell pointer to a named range elsewhere on the worksheet. You have two options. You can press the GOTO key and then enter the name of the range you wish to visit. Or you can press the GOTO key followed by the NAME or MENU key. The control panel displays a list of available range names. If you press NAME or MENU a second time, the full list appears on your screen. Highlight the name of the range you wish to visit and press Return.

7 RIDE THE RANGE

If you work with range names, you should learn to "ride the range." After you've assigned a range name, if you press slash (in *Symphony*, press MENU), select Range Name Create, and enter the name, your software highlights the named range.

At that moment, the highlight is anchored in the top-left cell of the range. The bottom-right cell holds a flashing cursor, which denotes the free corner of the range highlight. This free corner is always diagonally opposite the anchored corner. You can expand and contract the range highlight by pressing the Arrow keys to move the free corner.

But suppose that you need to expand the range highlight one row upward and two columns to the left? That's a simple task. Press the period key twice, and the free corner shifts to the upper-left corner. (In *Symphony*, you can use the period or the Tab key.) Now when you press the UpArrow key, the highlight expands upward one row. When you press the LeftArrow key, the highlight expands to the left.



While a range is highlighted, the cursor that identifies the free corner moves each time you press the period key. This process doesn't change the range's dimensions. In almost every case, the cursor moves clockwise to the next corner of the range highlight. In rare cases, the cursor may move counter-clockwise.

In either case, you can expand or contract a range highlight from any corner. And the technique also applies any time you identify a range by using the cell pointer. For example, in a blank worksheet, enter any values in cells B1 through B5. Move the cell pointer to cell B7 and type *@SUM(*. Now press the UpArrow key five times to move the pointer to cell B2. Press the period key to anchor the pointer in that cell. Then press DownArrow three times to highlight the remaining entries in the column.

You've almost written an @SUM formula, but you left out the value in cell B1. You can simply press the period key twice, then press UpArrow to include that fifth entry. To complete the formula, type a right parenthesis and press Return. ■

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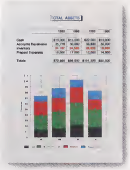
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Inventory
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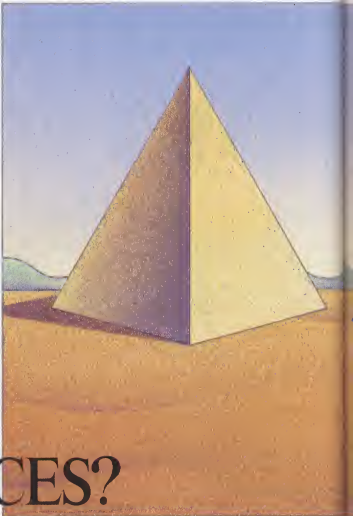


WHAT'S CAUSING THE DIFFERENCES?

Use two-way variance when variations in data can be due to one of two factors.

BY KEN SAUL

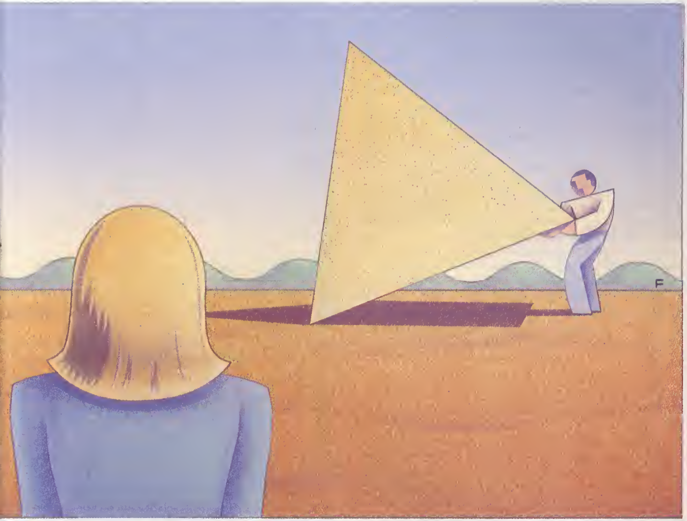
In the August issue of *LOTUS*, the article "Differences Are Not Always Real" showed you how to use the statistical technique known as one-way analysis of variance with *1-2-3* and *Symphony*. That technique tells you if differences in the averages of two or more sets of values are statistically significant.

The article stressed that one-way analysis of variance gives reliable results only when there is a single variable factor affecting the raw data. To interpret results that can be affected by two separate factors, you must create a new worksheet that performs two-way analysis of variance.

The August article used a fictional automobile maker, Peregrine Motor Co., to illustrate the analysis of variance technique. Peregrine's engineers had to choose among five possible carburetors, each of which was taken out on road tests to find the one that produced the highest gasoline mileage. Through analysis of variance, the engineers determined that there were significant differences among the average mileages for the different carburetor designs. However, they found no significant difference between the two best designs.

One-way analysis of variance was appropriate in that

Ken Saul is a manufacturing engineer with Hewlett-Packard Co.



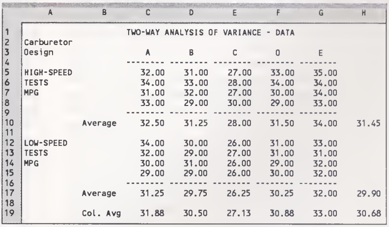
example because the only thing that varied in the road tests was the carburetor design. Let's see what might happen if Peregrine's engineers decide to test the carburetors at both high and low speeds.

THE TWO-WAY ANALYSIS WORKSHEET

The road-test data for a two-speed scenario appears in ranges C5..G8 and C12..G15 in figure 1. Note that each carburetor was tested four times at each speed. You may recall that one-way analysis of variance allowed you to use groups with different numbers of members. With two-way analysis of variance, you must have the same number of test trials within each group. The averages for the high-speed and low-speed test runs are calculated by using an @AVG formula, as are the overall averages for the rows and columns. A grand average appears in cell H19.

Besides entering the data itself, you must enter three values that define the dimensions of the data. These are the number of rows (in this case two, for high-speed and low-speed tests), the number of columns (in this case five, for the carburetor designs), and the number of trials per group (in this case four). The area of the worksheet where you enter these values appears in figure 2 on the next page. Formulas that compute two sets of intermediate values, interaction and within-groups sum of squares (SSi and SSw) also appear in figure 2.

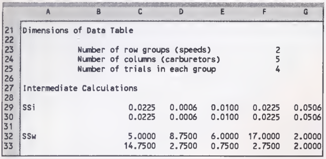
The analysis of variance table appears in the upper half of figure 3, in rows 41 through 57. This is the traditional



	A	B	C	D	E	F	G	H
1			TWO-WAY ANALYSIS OF VARIANCE - DATA					
2	Carburetor							
3	Design		A	B	C	D	E	
4			--------	--------	--------	--------	--------	
5	HIGH-SPEED		32.00	31.00	27.00	33.00	35.00	
6	TESTS		34.00	33.00	28.00	34.00	34.00	
7	MPG		31.00	32.00	27.00	30.00	34.00	
8			33.00	29.00	30.00	29.00	33.00	
9			--------	--------	--------	--------	--------	
10		Average	32.50	31.25	28.00	31.50	34.00	31.45
11								
12	LOW-SPEED		34.00	30.00	26.00	31.00	33.00	
13	TESTS		32.00	29.00	27.00	31.00	31.00	
14	MPG		30.00	31.00	26.00	29.00	32.00	
15			29.00	29.00	26.00	30.00	32.00	
16			--------	--------	--------	--------	--------	
17		Average	31.25	29.75	26.25	30.25	32.00	29.90
18								
19		Col. Avg	31.88	30.50	27.13	30.88	33.00	30.68

FIGURE 1. This section of the worksheet contains the data being analyzed and some simple averages (rows 10, 17, and 19).

MARK FISHER



```
          A           B         C         D         E         F         G

21 Dimensions of Data Table
22
23                Number of row groups (speeds)                 2
24                Number of columns (carburetors)               5
25                Number of trials in each group                4
26
27 Intermediate Calculations
28
29 SSi                      0.0225    0.0006    0.0100    0.0225    0.0506
30                          0.0225    0.0006    0.0100    0.0225    0.0506
31
32 SSw                      5.0000    8.7500    6.0000   17.0000    2.0000
33                         14.7500    2.7500    0.7500    2.7500    2.0000
```

FIGURE 2. When using the worksheet, you enter the numbers of rows, columns, and trials per group in range F23..F25. Also included in this section are intermediate calculations required to produce the results in the lower section of the worksheet. Formulas in rows 29 and 30 compute the interaction sum of squares (SSi), and formulas in rows 32 and 33 compute the within-groups sum of squares (SSw).

format used by statisticians. It gives an organized listing of the source of variation, the sum of squares, the degrees of freedom, and the mean square, or variance. Formulas in the rightmost column calculate F ratios. The worksheet uses the F ratios to determine the significance of each variable element in the data you're testing.

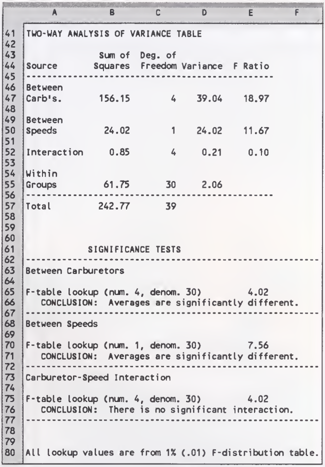
The lower half of figure 3 contains string-returning formulas that help you look up values in a table of F values. We'll look at that more closely in a moment. Other string-returning formulas interpret the comparisons between the values you look up and enter in column E and the F ratios in the analysis of variance table. The label in cell A80 indicates that the values entered in column E are taken from the 1%, or 0.01, F-distribution table. If you use a different table, change this label accordingly, to avoid confusion concerning the basis of your results.

Build the worksheet from the instructions on page 70. Note that the setup box doesn't direct you to enter the values in range E65..E75. The next section explains how you use the worksheet to interpret the results of the two-speed carburetor tests.

USING THE WORKSHEET

Once you've set up the worksheet's labels and formulas and entered the raw data, you must look up some values in an F-distribution table, which you'll find in most statistics textbooks or handbooks. For this exercise, use the table for a right-tail probability of 1% (or 0.01). Right-tailed probability is that area under the normal curve that is a certain number of standard deviations above the mean.

Start by testing the premise that there are significant differences among the gasoline mileages produced by the five carburetor designs. First look up a value in your printed F-distribution table by using the between-carburetors and within-groups degrees of freedom to select the appropriate column and row, respectively. Look at cell A65. The formula there currently returns *F-table lookup (num. 4, denom. 30)*. Accordingly, look along the top row of the F-distribution table (marked *numerator degrees of freedom* or *numerator df*) until you find 4. Then look down the leftmost column of the table (marked *denominator degrees of freedom* or *denominator df*) until you find 30. The number at the intersection of that column and row is 4.02. Enter that value in cell E65, then press the CALC key.



```
        A           B         C         D         E         F

41 TWO-WAY ANALYSIS OF VARIANCE TABLE
42
43                Sum of  Deg. of
44 Source        Squares  Freedom Variance  F Ratio
45 ------------------------------------------------
46 Between
47 Carb's.        156.15        4    39.04    18.97
48
49 Between
50 Speeds          24.02        1    24.02    11.67
51
52 Interaction      0.85        4     0.21     0.10
53
54 Within
55 Groups          61.75       30     2.06
56 ------------------------------------------------
57 Total          242.77       39
58
59
60
61            SIGNIFICANCE TESTS
62 -------------------------------------------------------
63 Between Carburetors
64
65 F-table lookup (num. 4, denom. 30)        4.02
66    CONCLUSION:  Averages are significantly different.
67 -------------------------------------------------------
68 Between Speeds
69
70 F-table lookup (num. 1, denom. 30)        7.56
71    CONCLUSION:  Averages are significantly different.
72 -------------------------------------------------------
73 Carburetor-Speed Interaction
74
75 F-table lookup (num. 4, denom. 30)        4.02
76    CONCLUSION:  There is no significant interaction.
77 -------------------------------------------------------
78
79
80 All lookup values are from 1% (.01) F-distribution table.
```

FIGURE 3. The labels and formulas in rows 41 to 57 make up the analysis of variance table, presented in the format traditionally used by statisticians. The formulas in cells A65, A70, and A75 help you look up values in the F-distribution table in your statistics textbook or handbook. As you look up the values, enter them in cells E65, E70, and E75. Once the spreadsheet is calculated, the string-returning formulas in cells A66, A71, and A76 give you the results of the comparison between the looked-up F values and the F ratios in the analysis of variance table. The label in cell A80 indicates the F table that is used. It must be changed if you use any other than the 1% table.

There are significant differences among the carburetor designs if the computed between-carburetors F ratio (cell E47) is greater than the F value you entered in cell E65. The string-returning formula in cell A66 applies this rule. Since 18.97 is greater than 4.02, cell A66 returns *CONCLUSION: Averages are significantly different.*

To test for a significant difference between the mileages obtained at high and low speeds, look at cell A70, which returns *F-table lookup (num. 1, denom. 30)*. The 1 refers to the between-speeds degrees of freedom (cell C50), and 30 is the within-groups degrees of freedom. Look up the value in the 1 column and the 30 row of the

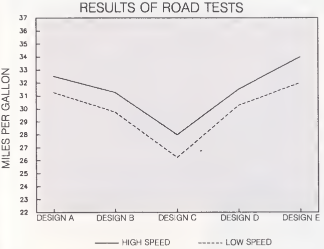


FIGURE 4. This graph demonstrates that although driver A gets higher gas mileage than driver B, both get comparable changes in results with the different carburetor designs. If interaction were present, the lines would cross or diverge.

1% F-distribution table. That number is 7.56. Enter 7.56 in cell E70 and press CALC. If the computed between-speeds F ratio (cell E50) is greater than the F-table value in cell E70, you conclude that there is a significant difference. The string-returning formula in cell A71 applies this rule and returns the appropriate message.

The third test you perform in a two-way analysis of variance is for interaction between the two variables. Cell A75 currently returns *F-table lookup (num. 4, denom. 30).* The interaction degrees of freedom (cell C52) is 4, and 30 is the within-groups degrees of freedom. We've just seen that 4.02 is the F-table value for numerator 4 and denominator 30, so enter 4.02 in cell E75 and press CALC. If the interaction F ratio (cell E52) is greater than the F-table value in cell E75, there is a significant interaction. This is not true here, so cell A76 returns *CONCLUSION: There is no significant interaction.*

The graph in figure 4 may help you understand the concept of interaction. High-speed tests consistently yield better gas mileage than low-speed tests. But the fact that the two lines are nearly parallel indicates that at either speed you get comparably better mileage when using more efficient carburetors. There would be an indication of some interaction if the lines crossed or diverged.

The absence of interaction is to be expected, since interaction would suggest that the speed affects the design efficiency of the carburetor or vice versa. Interaction would be more of an issue in, say, a survey. Suppose two survey-takers asked people from different age groups how much they typically spend on a birthday gift. The demeanor of the survey-takers might affect the way people respond to the question. In that case, two-way analysis of variance might indicate some interaction between the two variable factors (survey-taker and age group).

By using values from the 1% table, you are able to state the conclusions with a 99% certainty of their correctness. If you choose to state your conclusions with different degrees of certainty, look up the F values from a different table, such as the 5% (0.05) table for 95% certainty or the .5% (0.005) table for 99.5% certainty. But be sure to change the label in cell A80 to match the table so that others can be certain of the significance level you are using.

ADAPTING THE WORKSHEET

To make this model work for you, start by replacing all the labels that contain the words *carburetor, carb*, or *speed* with terms specific to the data you're using. Then refer to the following paragraphs that are appropriate to the dimensions of your data. Be sure to press CALC after making your changes. Then look up and enter F-table values as indicated by the string-returning formulas in the Significance Tests section, and then press CALC again.

If you need fewer columns than we've used, erase the data and @AVG formulas (rows 3 to 19) for the columns that are not used. Also erase the formulas in rows 29 to 33 in the columns from which you erased data. Enter the new number of columns in cell F24, press CALC, and proceed to the manual F-table lookup.

If you need more columns, insert the new columns between columns F and G. This is important in order to retain the row-averaging formulas without splitting any information in the analysis of variance table. With the cell pointer in column G, press slash and select Worksheet Insert Column (in *Symphony*, press MENU and select Insert Columns), use the RightArrow key if you want to insert more than one column, then press Return. Copy the formulas in cell F10 and ranges F17..F19 and F29..F33 into the resulting empty columns. Then enter the new number of columns in cell F24. Edit the first sum-of-squares formula, originally in cell B47, by adding references to the newly created column-average formulas. Precede the formulas by a plus sign and follow them by ^2.

For example, if you add one column to the spreadsheet, and you don't add any rows, edit cell B47 to read:

```
+trials*rows*(C19^2+D19^2+E19^
  2+F19^2+G19^2+H19^2)−trials*
  cols*rows*I19^2
```

If your data consists of more than two row groups—in our example there are just two speeds—insert space for more blocks, beginning at row 18. Enter the additional data and create a row of @AVG formulas, as well as grand-average formulas like the ones currently in cells H10 and H17. Edit the column-average formula, initially in cell C19, so that it includes the additional group averages, and copy this formula across columns as needed. Enter the new number of row groups (currently in cell F23).

Add new rows between the SSi and SSw formulas and enter new formulas in this area. The first new SSi formula in column C takes the following form:

$$(\text{new group avg} - \text{column avg} - \text{new group grand average} + \text{grand column avg})^2$$

Enter similar formulas for any other groups you've added, then copy the new formulas into the adjacent columns as needed.

Enter additional SSw formulas to accommodate the new groups. The first new SSw formula in column C takes the following form:

$$+\text{new group item } 1^2 + \text{new group item } 2^2 \ldots + \text{new group item } n^2 - \$\text{trials} \times \text{new group avg}\ ^2$$

Enter similar formulas for any other groups you've added, then copy the new formulas into the adjacent columns as needed. Amend the interaction and within-groups sum-of-squares formulas to include the additional SSi and SSw values. Then amend the second sum-of-squares formula (originally in cell B50) to include the new group grand averages that you've added.

If you have fewer than four data points per group, just erase the data you don't need and modify the number-of-trials value in cell F25.

If you have more than four data points per group, insert new rows between the last and second-to-last row of data in each group and enter the new data. Modify each formula in the first column of SSw formulas, making sure that the value in each cell in each group of data is squared. Then copy these formulas into the adjacent columns as needed. Finally, enter the new number of trials per group. ■

HOW TO SET UP THE TWO-WAY ANALYSIS OF VARIANCE WORKSHEET

1. Default settings

Recalculation: Manual

1-2-3: /Worksheet Global Recalculation Manual
Symph: MENU Settings Recalculation Method Manual Quit

Format: Fixed 2

1-2-3: /Worksheet Global Format Fixed, press Return
Symph: MENU Settings Format Fixed, press Return, select Quit

2. Individual column width

A 12

With the cell pointer in column A, select

1-2-3: /Worksheet Column Set-Width, enter 12
Symph: MENU Width Set, enter 12

3. Cell formats

Format	**Range**
General	F23..F25
Fixed 4	C29..C30
Fixed 4	C32..C33
General	C47..C55

For example, to set the format of range F23..F25, select

1-2-3: /Range Format General, specify range F23..F25
Symph: MENU Format General, specify range F23..F25

4. Labels

Enter all the labels shown in figure 1. Center the column headings in row 3: Select /Range Label Center (*Symph*: MENU Range Label-Alignment Center) and specify range C3..G3. Enter an apostrophe and eight hyphens ('--------) in cell C4, and copy cell C4 to ranges D4..G4, C9..G9, and C16..G16.

Enter all labels shown in figure 2. Then enter the labels shown in rows 41 to 44 of figure 3. Right-align the labels in range B43..E44. Enter a \- in cell A45, and copy cell A45 to ranges B45..E45, A56..E56, A62..F62, A67..F67, A72..F72, and A77..F77. Enter the labels in range A46..A57 and in cells B61, A63, A68, A73, and A80.

5. Values

Enter the values shown in ranges C5..G8 and C12..G15 of figure 1. Enter the values shown in range F23..F25 of figure 2.

6. Range names

Name	**Range**
rows	F23
cols	F24
trials	F25

For example, to assign the name to cell F23, press slash (*Symph*: MENU), select Range Name Create, enter *rows*, and specify cell F23.

7. Formulas

Cell	**Formula**
C10	@AVG(C5..C8)

Copy cell C10 to ranges D10..G10 and C17..G17.

H10	@AVG(C10..G10)

Copy cell H10 to cell H17.

C19	@AVG(C10,C17)

Copy cell C19 to range D19..H19.

C29	(C10 − C19 − $H$10 + $H$19)^2
C30	(C17 − C19 − $H$17 + $H$19)^2
C32	+ C5^2 + C6^2 + C7^2 + C8^2 − $trials*C10^2
C33	+ C12^2 + C13^2 + C14^2 + C15^2 − $trials*C17^2

Copy range C29..C33 to range D29..G29.

B47	+ trials*rows*(C19^2 + D19^2 + E19^2 + F19^2 + G19^2) − trials*cols*rows*H19^2
B50	+ trials*cols*(H10^2 + H17^2) − trials*cols*rows*H19^2
B52	+ trials*@SUM(C29..G30)
B55	@SUM(C32..G33)
B57	@SUM(B47..B55)

Copy cell B57 to cell C57 and assign the general format to cell C57.

C47	+ cols − 1
C50	+ rows − 1
C52	+ C47*C50
C55	+ rows*cols*(trials − 1)
D47	+ B47/C47

Copy cell D47 to cells D50, D52, and D55.

E47	+ D47/D$55

Copy cell E47 to cells E50 and E52.

A65	+ "F-table lookup (num. "&@STRING(C47,0)&", denom. "&@STRING(C55,0)&")"
A66	+ " CONCLUSION: Averages are "&@IF(E47>E65,"","not ")&"significantly different."
A70	+ "F − table lookup (num. "&@STRING(C50,0)&", denom. "&@STRING(C55,0)&")"
A71	+ " CONCLUSION: Averages are "&@IF(E50>E70,"","not ")&"significantly different."
A75	+ "F − table lookup (num. "&@STRING(C52,0)&", denom. "&@STRING(C55,0)&")"
A76	+ " CONCLUSION: There is "&@IF(E52>E75,"a ","no ")&"significant interaction."

Note: Cell A76 initially returns a string different from the one in figure 3.

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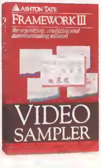


CIRCLE 114 ON READER SERVICE CARD

Beyond @SUM

Even if you're a relative beginner, you can use a variety of @functions to build a useful model.

BY LARRY ROSHFELD

Software users typically rely on a small set of features for most of their work. A few basic skills go a long way in *1-2-3* and *Symphony*. Sometimes, however, you run into a problem that can't be solved with basic formulas.

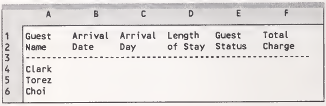
Fortunately, a lot of seemingly complicated operations can be solved quite simply by applying the appropriate @function. *1-2-3* and *Symphony* provide several types of @functions: statistical, mathematical, financial, database statistical, string, date and time, logical, and special. We presented an extensive survey of @functions in our September Special Report on formulas.

This article presents a small sampling of useful @functions in the context of a simple application. You'll learn about @CHOOSE, @MOD, @DATEVALUE, @IF, and @VLOOKUP. If you've never explored the @functions, observe how these building blocks can be assembled in creative and useful ways.

THE PROBLEM

Let's say you're the owner of Laurie's Lunch and Lodging. You want to build a worksheet model that calculates the total charge for each guest's stay. A number of factors go into that calculation: the guest's arrival day and date, length of stay, and rate status—regular, repeat, or senior citizen. Once you get that information into your spreadsheet, you will have what you need to calculate each guest's bill.

The next step is to decide where to enter the raw data—name, arrival day and date, length of stay, and status—and where to calculate the total charge. Enter the labels as shown in the screen below:



```
      A          B          C          D          E          F

1  Guest      Arrival    Arrival    Length     Guest      Total
2  Name       Date       Day        of Stay    Status     Charge
3  -------------------------------------------------------------
4  Clark
5  Torez
6  Choi
```

To create the dashed line in row 3, enter a backslash and a hyphen (\–) in cell A3 and copy that cell to range B3..F3. For entering the arrival dates in column B, you have two choices. You can enter the dates as labels by preceding each date with a label-prefix character in a form such as '11/12/89. Or you can enter the dates as values by using the @DATE function.

The @DATE function requires three arguments—*year, month*, and *day*—and returns a serial number that represents the date. The fundamentals of how *1-2-3* and *Symphony* handle dates are described in the following section, "Use Date Logic." The advantage of using the @DATE function is that it generates a value you can use in other calculations. The disadvantage is that @DATE formulas are cumbersome to enter and, if you have many of them, they can slow down worksheet recalculation.

For sheer ease of entry, enter these dates as labels:

Cell	Label
B4	'11/12/89
B5	'11/15/89
B6	'11/23/89

The next column of your model will contain arrival days, which you can manually enter in column C as *Sun*, *Mon*, and so on. You can also devise a formula to do this job. Let's opt for the formula.

USE DATE LOGIC

The formula that returns the day of the week must evaluate the label representing the date in column B and determine on what day of the week that date falls. To use the dates in column B in a calculation, you need to convert them into serial numbers. The @DATEVALUE function accomplishes that task. You entered the label '11/12/89 in cell B4. Enter the formula @DATEVALUE(B4) in cell C4. This formula returns the date serial number 32824, which represents the date November 12, 1989. *1-2-3* and *Symphony* assign a date serial number based on the number of days since January 1, 1900.

This discussion of dates wouldn't be complete without mentioning the error in *1-2-3*'s and *Symphony*'s date arithmetic. All releases of both programs erroneously treat the year 1900 as a leap year. That means that when you calculate the days of the week and the calculations involve dates prior to March 1, 1900, the formulas return the wrong days of the week. This is because *1-2-3* considers February 29, 1900 to be a valid date. As long as you use dates after March 1, 1900, the date arithmetic works correctly.

Fortunately, our model doesn't require dates prior to March 1, 1900. In the formula we use, if you divide the date serial number of any Saturday by 7, the remainder will be 0. If you divide the date serial number of any Sunday by 7, the remainder will be 1. So to determine the day of the week for any date, divide the date serial number by 7. The remainder, indicating the day of the week, will be a value between 0 and 6.

Rather than use basic math to determine the remainder, use the @MOD function. This function requires two arguments: *numerator* and *denominator*. For example, the formula @MOD(15,7) returns the value 1, since the remainder of 15 divided by 7 is 1.

You can replace the numerator argument in the @MOD formula with either a cell reference, such as B4, or another formula or function. The numerator that you want to use is the result of an @DATEVALUE formula. The denominator that you use is 7, the number of days in a week. Therefore you nest the formulas as follows:

@MOD(@DATEVALUE(B4),7)

The @DATEVALUE portion of the formula returns the date serial number for the date you entered in cell B4. The @MOD portion of the formula divides that value by 7 and returns the remainder. To test this formula, edit cell C4 so that it includes the @MOD function shown above. It returns 1, indicating that November 12, 1989 falls on a Sunday.

You could use the formula as is and simply remember that 1 stands for Sunday, 2 for Monday, and so forth. But you'd probably rather have an abbreviation, such as *Sun*, *Mon*, or *Tue*, appear in column C. That calls for a little extra refinement.

There are two equally valid ways to obtain labels in place of remainders. You can use the @CHOOSE function, which is the better choice if the model will use the formula in only a few cells. The second option is to use the @VLOOKUP function, which is better if the model will use the same formula in many cells.

Let's consider the first option, @CHOOSE. This function requires a selector value and a list of items. Based on the selector value you specify, the function chooses which item from the list to display in the cell. The first item in the list, in this case *A*, is represented by 0, the second by 1, and so on. Therefore, the formula @CHOOSE(1,"A", "B","C") returns the label *B*. If the selector were 0, the function would return the label, *A*.

To choose abbreviations for the days of the week, you specify the abbreviations as the list items in the @CHOOSE portion of the formula. You use the following formula—the one you have already built—to return a value that you'll use as the selector-value argument in the @CHOOSE formula:

@MOD(@DATEVALUE(B4),7)

To put all of this together, edit the formula in cell C4 so that it looks like the one below:

@CHOOSE(@MOD(@DATEVALUE(B4),7),
"Sat","Sun","Mon","Tue","Wed",
"Thu","Fri")

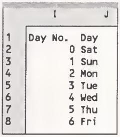
This formula returns the label *Sun*. In the formula the @DATEVALUE function returns the date serial number 32824. The @MOD function divides 32824 by 7 and calculates a remainder of 1. The @CHOOSE function chooses the label in position 1 of the list and returns *Sun*.

This approach fills the bill in many cases. But if you need to use this calculation repeatedly in your model, there is one major drawback. The formula consumes a lot of memory. Instead of using it, you might consider using the @VLOOKUP function.

The advantage of an @VLOOKUP formula is that it enables you to store data in a table and use different formulas to refer to it. This differs from the @CHOOSE formula, in which each formula consumes a lot of memory because it must include all seven abbreviations for the days of the week.

The @VLOOKUP function requires three arguments: *search_value, table_range*, and *column_number*. The search value is the value or label that the @VLOOKUP formula will locate in the table. The Table range is the location of the lookup table itself. The column number is the number of the column in the table that contains the value or label that you want the formula to return.

You have a formula that returns a number indicating the day of the week: @MOD(@DATEVALUE(B4),7). Your table, therefore, needs a column of day-number remainders (0 through 6) and a column of the day-of-the-week abbreviations that are paired with the day numbers. Enter the table to the right.



	I	J
1	Day No.	Day
2	0	Sat
3	1	Sun
4	2	Mon
5	3	Tue
6	4	Wed
7	5	Thu
8	6	Fri

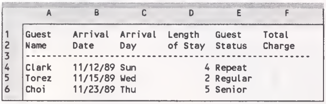
To use the table, edit the formula in cell C4 so that it matches the following one:

@VLOOKUP(@MOD(@DATEVALUE(B4),7),
I$1..J$8,1)

This formula returns the label *Sun*. Here's how it works. The formula @DATEVALUE(B4) returns the number 32824. The @MOD function divides that number by 7 and calculates a remainder of 1. The @VLOOKUP function looks down the first column of range I1..J8 until it finds a value equal to 1. Then it returns the contents of the cell that is located one column to the right of the value 1. That cell contains the label *Sun*. To obtain the day labels for the rest of your model, press slash and select Copy (in *Symphony*, MENU Copy) and copy cell C4 to range C5..C6.

Note the use of dollar signs in the formula. They indicate an absolute reference and thus keep the row references from changing when the formula is copied.

Next, enter each guest's length of stay and status as shown in range D4..E6 of the following figure:

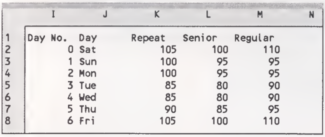


	A	B	C	D	E	F
1	Guest	Arrival	Arrival	Length	Guest	Total
2	Name	Date	Day	of Stay	Status	Charge
3	----------	----------	----------	----------	----------	----------
4	Clark	11/12/89	Sun	4	Repeat	
5	Torez	11/15/89	Wed	2	Regular	
6	Choi	11/23/89	Thu	5	Senior	

DETERMINE TOTAL CHARGE

Now all you need to calculate is the total charge for each guest's stay. To do this, you use the guest's arrival day and status to determine the nightly rate. Then multiply that rate by the total length of stay to calculate the total charge. To simplify the example, we will base the charge for each day of the guest's stay on the arrival-day price. The techniques discussed here could be applied to charging a different rate for each day.

To find the appropriate rate, add a few columns to your data table and use another @VLOOKUP formula. To begin, enter the data shown in columns K through M.



	I	J	K	L	M	N
1	Day No.	Day	Repeat	Senior	Regular	
2	0	Sat	105	100	110	
3	1	Sun	100	95	95	
4	2	Mon	100	95	95	
5	3	Tue	85	80	90	
6	4	Wed	85	80	90	
7	5	Thu	90	85	95	
8	6	Fri	105	100	110	

To calculate the total charges in column F, you want the @VLOOKUP function to look down column J of the table until it finds the arrival day. Then the formula looks at the column containing the nightly rates for that guest's status and returns the value contained in that cell. Finally the formula multiplies the nightly rate by the length of stay to calculate the total charge.

To create a formula to calculate the total charge, start with the day of the week that was calculated in cell C4 and use the result of that calculation to look up a value in the table in range J1..M8. Notice that you're not using column I of the table. Since you have already calculated the day of the week, it makes sense to reuse that result.

The guest's status determines the column that contains the value the @VLOOKUP formula should return. For example, if the guest is a senior citizen, the formula must return a rate from column L of the table. For problems that involve if...then reasoning, use an @IF formula as the column-number argument in the @VLOOKUP function.

An @IF function determines if a condition is true or false. If the condition is true, the formula returns one answer. If the condition is false, the formula returns a different answer. Since you have three possibilities for guest status, you can't use a single @IF function. Instead you nest one @IF function inside another. This allows you to construct a formula that says, "If the status is *Repeat*, then use the column labeled *Repeat*. If the status is not *Repeat*, check if the status is *Senior*. If the status is *Senior*, use the column labeled *Senior*. Otherwise, use the column labeled *Regular*."

The structure of the nested @IF function is as follows:

@IF(E4="Repeat",1,@IF(E4="Senior",2,3))

This formula says, "If cell E4 contains the label *Repeat*, then return the value 1. If cell E4 doesn't contain the label *Repeat*, then return the result of the second @IF function." The second @IF function says, "If cell E4 contains the label *Senior*, then return the value 2. Otherwise, return the value 3."

If you enter this formula into a blank cell, it returns the value 1, since the guest status in cell E4 is *Repeat*. The formula that you'll write in a moment will use this @IF formula as the column-number argument, which tells the @VLOOKUP formula which column it should use to find the daily rate for that guest.

Enter the following formula in cell F4:

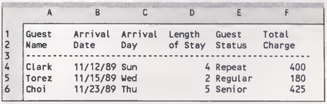
```
@VLOOKUP(C4,J$1..M$8,
  @IF(E4="Repeat",1,
  @IF(E4="Senior",2,3)))
```

In this formula cell C4 is the calculated day of the week, J1..M8 is the range containing the day-of-the-week and rate columns, and the @IF functions determine which rate column contains the rate for that particular guest. In this sample formula, where the guest has *Repeat* status and is arriving on a Sunday, the @VLOOKUP formula returns the value 100. To confirm that answer, look down column J until you come to the label *Sun*. Then move right to cell K3 in column K, which contains the *Repeat* guest rates. The value in that cell is 100.

Now that you've built the portion of the formula that returns the nightly rate, it's easy to add what's needed to calculate the total charge. Just multiply the daily rate, which was calculated in the @VLOOKUP formula, by the length of the stay. Editing cell F4 so that it contains the following formula does the job:

```
+D4*@VLOOKUP(C4,J$1..M$8,
  @IF(E4="Repeat",1,
  @IF(E4="Senior",2,3)))
```

This formula multiplies the length of the stay, located in cell D4, by the nightly rate. To complete the model, copy cell F4 to range F5..F6. Your finished model looks like this:



	A	B	C	D	E	F
1	Guest	Arrival	Arrival	Length	Guest	Total
2	Name	Date	Day	of Stay	Status	Charge
3	----------	----------	----------	----------	----------	----------
4	Clark	11/12/89	Sun	4	Repeat	400
5	Torez	11/15/89	Wed	2	Regular	180
6	Choi	11/23/89	Thu	5	Senior	425

Larry Roshfeld is a senior systems engineer with Lotus Development Corp.

Keep That Money Working

You've paid your bills. Now be sure to exploit the float.

BY KEN LANDIS

A new breed of corporate cash manager is exploiting delays in the payment cycle to reap rewards for his company. By placing disbursement dollars in high-yield, short-term investments for the period between the time a payment is made and when it is collected, a cash manager can earn substantial interest for the company. The practice is called working the float, and it is becoming increasingly common in corporations.

Float is the difference between a company's checkbook balance and its balance on the bank's books. The balance the bank carries is called the ledger balance. For example, assume that you open a checking account with a deposit of $1,000. Your ledger balance is $1,000. On the day you open the account, you write a $400 check, record it in your check register, and deduct this amount from your opening balance. Your checkbook balance is now $600. Until your check has cleared, however, your bank continues to show a ledger balance of $1,000 on your account. During the time between when you write the check and when the bank deducts it from your account, you can invest the $400 and let it earn additional interest.

The trick in investing float funds is to predict accurately the amount of time the funds are available. Guess wrong and you end up overdrawing your account or activating an overdraft line of credit. The consequence of either is likely to be a fee.

This worksheet helps you forecast how long a float is available, and it calculates the gain (or loss) you realize from your investments. You can use the worksheet in any release of *1-2-3* or *Symphony*. Instructions for building it appear in the box on page 79.

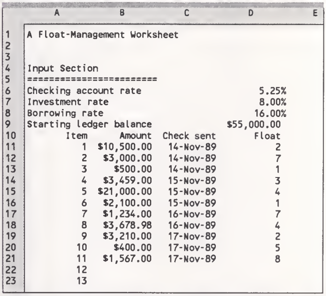
ABOUT THE WORKSHEET

The worksheet has three sections: the Input, Accumulator, and Calculation sections. Let's look first at the Input Section in figure 1.

To determine the additional interest income you can earn on float investments, you enter an investment interest rate in cell D7. This is the rate that a money market fund or an interest-bearing account yields. It should be more than the rate you earn on your regular checking account, which you enter in cell D6.

The worksheet assumes that you have overdraft coverage on your business checking account. The borrowing rate in cell D8 is the interest that your bank charges on overdrafts. If you don't have overdraft coverage, you must change the label in cell A8 to *Returned-check fee*. You must also change some formulas that calculate the interest income or expense. More on that later.

In cell D9 you record your starting ledger balance. This should be equivalent to your current ledger balance minus any checks you have outstanding that are not included in the worksheet. If you have to approximate the starting ledger balance when you first use the worksheet, be



```
            A              B           C             D          E
 1   A Float-Management Worksheet
 2
 3
 4   Input Section
 5   ========================
 6   Checking account rate                              5.25%
 7   Investment rate                                    8.00%
 8   Borrowing rate                                    16.00%
 9   Starting ledger balance                       $55,000.00
10          Item       Amount  Check sent             Float
11             1   $10,500.00   14-Nov-89                 2
12             2    $3,000.00   14-Nov-89                 7
13             3      $500.00   14-Nov-89                 1
14             4    $3,459.00   15-Nov-89                 3
15             5   $21,000.00   15-Nov-89                 4
16             6    $2,100.00   15-Nov-89                 1
17             7    $1,234.00   16-Nov-89                 7
18             8    $3,678.98   16-Nov-89                 4
19             9    $3,210.00   17-Nov-89                 2
20            10      $400.00   17-Nov-89                 5
21            11    $1,567.00   17-Nov-89                 8
22            12
23            13
```

FIGURE 1. The Input Section contains interest rates and the starting ledger balance, and it collects data on each check you write. The data include an item number, a check amount, the date when the check was sent, and an estimate of the number of days of float.

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conservative in your estimate. Remember, the model assumes that all of the checks you write are written against your ledger balance as of the day you use the model.

In the example, let's assume that the bank shows a ledger balance of $65,000. You know, however, that in the past week you've written a $10,000 check that has not yet cleared. So you enter $55,000 as your starting ledger balance in cell D9.

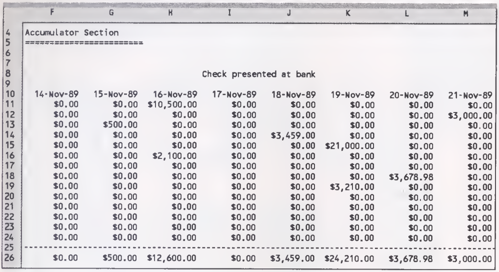
The remaining data you must enter in the Input Section includes an item number for each check you write, the amount of each check, the date the check was sent, and your estimate of the float time for each check. The box titled "Float Time and How to Forecast It" provides guidelines for estimating float time.

The example worksheet can manage 13 checks. If you need to track more checks than that, insert as many rows as required below row 23. Be sure to copy the formulas in the Accumulator Section down the worksheet as required.

ACCUMULATOR LOGIC TRACKS FLOAT

The Accumulator Section appears in figure 2. Formulas in this section sort checks by the date the checks are sent and by the number of days of expected float time. Logic in

HAL MAYFORTH



	F	G	H	I	J	K	L	M
4	Accumulator Section							
5	=======================							
6								
7								
8					Check presented at bank			
9								
10	14-Nov-89	15-Nov-89	16-Nov-89	17-Nov-89	18-Nov-89	19-Nov-89	20-Nov-89	21-Nov-89
11	$0.00	$0.00	$10,500.00	$0.00	$0.00	$0.00	$0.00	$0.00
12	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00
13	$0.00	$500.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
14	$0.00	$0.00	$0.00	$0.00	$3,459.00	$0.00	$0.00	$0.00
15	$0.00	$0.00	$0.00	$0.00	$0.00	$21,000.00	$0.00	$0.00
16	$0.00	$0.00	$2,100.00	$0.00	$0.00	$0.00	$0.00	$0.00
17	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
18	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,678.98	$0.00
19	$0.00	$0.00	$0.00	$0.00	$0.00	$3,210.00	$0.00	$0.00
20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
21	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
22	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
23	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
24	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
25	----------	----------	----------	----------	----------	----------	----------	----------
26	$0.00	$500.00	$12,600.00	$0.00	$3,459.00	$24,210.00	$3,678.98	$3,000.00

FIGURE 2. The Accumulator Section sorts checks according to the estimated days of float. Once checks are sorted, @SUM formulas in row 26 calculate the dollar amounts of the checks cleared each day.

these formulas tests each check by using the date serial numbers generated by the formulas in cells F10 through M10. Column F represents today; column G, tomorrow; column H, the next day; and so on.

Each check from the Input Section is assigned to an accumulator column according to the day it was sent and its expected float time. Column H is the float-accumulator column for items that will clear two days from the present. Cell H11 contains check number 1, a $10,500 check sent on November 14, with two days of estimated float time. Check number 2 for $3,000 appears in cell M12. It was also sent on November 14, but it has seven days of expected float time.

The Accumulator Section provides for a total of seven days of float time. If you find that you have float times exceeding seven days, copy cells M10 through M26 to columns N, O, P, and so on, adding one column for each additional day of float time that you need.

The @SUM formulas in row 26 total the entries in each accumulator column. These totals are the forecasted amounts of dollars that will clear the bank on a given day. For example, cell H26 indicates that $12,600.00 will clear the bank on November 16. Cell J26 indicates that $3,459.00 will clear two days later.

CALCULATION SECTION MEASURES GAINS

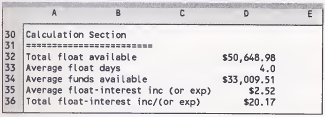
The Calculation Section of the spreadsheet appears in figure 3. It returns several important results: the total float available, the average number of float days, the average amount of available funds, and the average and total float-interest income or expense. In addition, this section provides daily ledger balances, the total dollar amount of the checks that have cleared each day, and the daily funds available for investment.

An overview of your float status is provided in range D32..D36. A formula in cell D32 calculates the total float. This formula sums the check amounts in range B11..B23.

The average number of float days is calculated in cell D33. It is determined by averaging forecasted floats in range D11..D23.

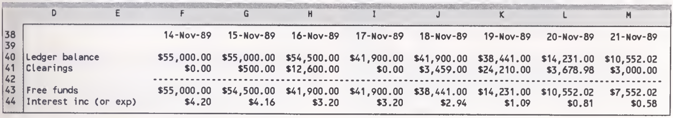
The average amount of float funds that is available for higher-interest investment appears in cell D34. It is calculated by averaging the funds that are available today and for each of the next seven days, which are in cells F43 through M43.

You determine the investment option according to the



	A	B	C	D	E
30	Calculation Section				
31	=======================				
32	Total float available			$50,648.98	
33	Average float days			4.0	
34	Average funds available			$33,009.51	
35	Average float-interest inc (or exp)			$2.52	
36	Total float-interest inc/(or exp)			$20.17	

FIGURE 3. The Calculation Section returns an overview of your float situation in range A30..D36 (to the left) and specific daily data in range D38..M44 (below). The daily summaries enable you to track balances, the amount of cleared checks, and interest earnings on a day-to-day basis.



	D	E	F	G	H	I	J	K	L	M
38			14-Nov-89	15-Nov-89	16-Nov-89	17-Nov-89	18-Nov-89	19-Nov-89	20-Nov-89	21-Nov-89
39										
40	Ledger balance		$55,000.00	$55,000.00	$54,500.00	$41,900.00	$41,900.00	$38,441.00	$14,231.00	$10,552.02
41	Clearings		$0.00	$500.00	$12,600.00	$0.00	$3,459.00	$24,210.00	$3,678.98	$3,000.00
42			----------	----------	----------	----------	----------	----------	----------	----------
43	Free funds		$55,000.00	$54,500.00	$41,900.00	$41,900.00	$38,441.00	$14,231.00	$10,552.02	$7,552.02
44	Interest inc (or exp)		$4.20	$4.16	$3.20	$3.20	$2.94	$1.09	$0.81	$0.58

amount in cell D34. For example, if you're dealing with a small amount, say, less then $100,000, leaving the money in an interest-bearing checking account makes sense. If the amount in cell D34 is more than $100,000, you may want to increase your return by investing in a short-term certificate of deposit.

Cell D35 shows the average additional interest income (or expense) for the next seven days.

The total float-interest income or expense appears in cell D36. This is the sum of interest income calculated in range F44..M44. The amount in cell D36 is the total float-interest income forecasted by the worksheet. This calculation is based on your investment rate and expected amounts of float time.

If you overdraw your account, cell D36 returns the expense amount you incur.

DAY-TO-DAY DATA

Range F38..M44 of the Calculation Section includes formulas that return day-to-day, float-related information for seven days into the future. This information includes daily ledger balances, cleared checks, amounts of float, and interest or expense values.

Formulas in row 38 are copies of those in row 10. They use an @NOW function to generate date serial numbers. Cell F38 contains the formula @INT(@NOW), which calculates the present day's date. Cell G38 contains the formula F38 + 1, which represents the first day of float time.

Row 40 contains ledger balances. Cell F40's formula refers to the starting ledger balance in cell D9. Cell G40's formula references the result of the float calculation in cell F43. Subsequent daily ledger balances derive from the results of float calculations for the previous day. For example, day three's ledger balance is the same as the amount of free funds on day two. Similarly, day four's ledger balance is the same as the amount of free funds on day three.

The checks that clear daily are represented in row 41. These amounts are taken from the sums in row 26.

The free-funds calculations in row 43 subtract from the daily ledger balance the total amount cleared each day. The result is the amount of funds in the bank that is available each day for investment.

Row 44 contains the final bit of daily data. Here the additional daily investment-interest income or overdraft-interest expense is calculated. An @IF function tests to see if the daily amount of free funds is greater than zero. If it is, the formula multiplies the amount of free funds by an interest rate. This rate is equal to the investment rate in cell D7 minus the nominal checking rate in cell D6 divided by 360. This yields the daily interest income.

If the float amount is less then zero, then the overdraft amount is multiplied by the quotient of the borrowing rate in cell D8 divided by 360. This yields the overdraft-interest expense.

MODIFICATIONS AND EXPANSIONS

What if you don't have overdraft protection? To modify the model to account for charges on returned checks rather than for overdraft-interest expenses, you must edit

HOW TO SET UP THE FLOAT-MANAGEMENT WORKSHEET

1. Default settings

Format: Currency 2

1-2-3: /Worksheet Global Format Currency, press Return
Symph: MENU Settings Format Currency, press Return, then Quit

Column width: 12

1-2-3: /Worksheet Global Column-Width, enter 12
Symph: MENU Settings Width, enter 12, then press Quit

2. Cell formats

Format	Range
Percent 2	D6..D8
Fixed 0	A11..A23, D11..D23
Fixed 1	D33
Date 1	C11..C23, F10..M10, F38..M38

For example, to set the format of range D6..D8, select

1-2-3: /Range Format Percent, press Return to accept two decimal places, indicate range D6..D8
Symph: MENU Format %, press Return to accept two decimal places, indicate range D6..D8

3. Labels
Enter the labels shown in figures 1, 2, and 3. To create the dashed lines, enter a backslash followed by a minus sign or an equal sign, then copy the cell as necessary.

4. Values
Enter the values shown in figure 1.

5. Enter and copy formulas
Enter the dates shown in range C11..C21 using the @DATE function.

Cell	Formula
F10	@INT(@NOW)
G10	+F10+1

Copy cell G10 to range H10..M10.
Copy range F10..M10 to cell F38.

F11 @IF($C11+$D11=F$10,$B11,0)

Copy the formula in cell F11 to range F11..M24.

F26 @SUM(F11..F24)

Copy the formula in cell F26 to range G26..M26.

D32	@SUM(B11..B23)
D33	@AVG(D11..D23)
D34	@AVG(F43..M43)
D35	@AVG(F44..M44)
D36	@SUM(F44..M44)
F40	+D9
G40	+F43

Copy the formula in cell G40 to range H40..M40.

F41 +F26

Copy the formula in cell F41 to range G41..M41.

F43 +F40-F41

Copy the formula in cell F43 to range G43..M43.

F44 @IF(F43>0,F43*(D7-D6)/360,F43*D8/360)

Copy the formula in cell F44 to range G44..M44.

the @IF formulas in range F44..M44. Instead of multiplying the negative amount by the borrowing rate divided by 360, edit the formula in cell F44 to return a $25 charge when the float amount is less than zero. Copy the edited formula, which is shown below, to range G44..M44.

```
@IF(F43>0,F43*($D$7−$D$6)/360,−25)
```

This approach may not be completely satisfactory, since the penalties you incur for bounced checks may vary, depending on the number of checks involved and the relationship you have with your bank. If that's the case, modify the @IF formulas as necessary to reflect the specifics of the penalty system your bank uses.

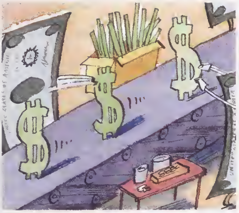
In addition, if you have a compensating-balance or minimum-balance arrangement with your bank, you must deduct that amount from your starting ledger balance in cell D9. Although this simple approach doesn't take into account that your compensating balances are calculated on an average basis, it is sufficient to keep the worksheet accurate.

If you intend to manage float funds aggressively, you can add to the worksheet a column titled *Actual float*. Here you record the actual float time of each check, which you can then use to perform a variance analysis of actual and estimated float time. This will show you whether you need to refine your estimates of float. ■

FLOAT TIME AND HOW TO FORECAST IT

In any float-management system, you must account for three types of float: mail float, processing float, and clearing float. By accurately forecasting each type, you can safely invest your company's available funds.

Mail float is the amount of time it takes for a check to reach its destination. For example, if it takes a first-class letter four days to go from New York to Los Angeles, then the mail float for a check mailed first class is four days. As you might expect, the more distant the destination, the greater the mail float. In addition to distance, factors such as weather, the efficiency of the local postal system, and weekends and holidays affect mail float.



For companies that issue lots of checks, accurately predicting the exact mail float can be worth thousands of dollars in interest income. Because of this, companies such as Phoenix-Hecht of Raleigh, N. C., conduct annual studies that track mail-delivery times. The company sells the results of these studies to high-volume mailers that incorporate the data into sophisticated systems for cash disbursement and cash collection.

For our purposes, use these simple rules to determine mail float. Assume one day of mail float for local destinations. Assume two days of mail float for out-of-town destinations on your side of the Mississippi River. And assume three days for destinations across the Mississippi and for other distant locales. To this time add weekends and holidays. Businesses and many banks don't process payments on Saturdays and Sundays or on state and federal holidays.

For example, a check sent from St. Louis to Atlanta on Thursday has a total mail float of five days: three days in the mail plus two weekend days.

If you intend to maximize the return on float investments, you will want to track your estimates of mail float carefully and refine your forecasts as necessary. A one-day difference between actual and forecasted mail float can mean the difference between interest income or interest expense. Consequently, it is wise to be slightly conservative when estimating mail float.

Processing float is the time it takes for the company to which you sent the check to record that it received the check, to update its records, and to deposit the check in a bank.

Companies that have hundreds or thousands of customers, or that have just a few customers who send in large sums of money, speed up their collection of funds with an efficient payment-processing system known as a lockbox. Payments sent to a lockbox are deposited within hours of arrival.

The easiest way to identify if your payments are going to a lockbox is to check the address. If it is a post office box, assume you're dealing with a lockbox. If a street address is used, it's unlikely that a lockbox is involved.

The rules for estimating processing float are simple. Payments sent to lockboxes have zero processing float. Payments sent directly to a street address have between one and two days of processing float. Let experience be your guide when dealing with payments sent to street addresses.

Clearing float is determined by the type and size of the bank in which the check is deposited, that bank's location, and how expeditious the bank's check processing is. Because it is virtually impossible to forecast the result of combining these variables, consider clearing float to be one to two days. If the check is deposited in the same bank on which it is drawn, assume clearing float to be zero days.

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THE TIME TRACKER

Are your company's hours well spent? Find out with this time-analysis worksheet.

BY DAVID A. CURTIS

Professional and consulting firms struggle with a perennial problem: wide swings in their volume of business. One month everyone is busy working for clients—too busy to develop new business. The next month everyone is scrambling to land another contract. The short-term goal is usually to maximize billable time. However, this strategy contributes to inconsistent work loads.

The worksheet described here addresses the problem by helping you manage time more effectively. It also enables you to strike a more profitable balance among business activities. You can use it in any version of *1-2-3* or *Symphony*, and instructions for building it appear on page 86.

Worksheet formulas calculate productivity percentages. All calculations are based on the amount of time you spend on billable activities. The calculations also factor in the percentage of time you spend on constructive, long-range activities that may lead to billable work.

Most firms use time sheets for payroll and invoices. The worksheet uses information from time sheets. Because a staff member may occasionally forget to submit a time sheet, make an error when recording time, or try to beat the system, the worksheet has features that deal with these problems as well.

David A. Curtis is a management consultant based in Concord, Mass.

MOLLY QUINN

OVERVIEW OF THE MODEL

In order to use the worksheet, you must first develop a time-allocation plan. This plan must specify the percentage of time you intend to allocate to five types of business activities. The five categories are:

1. billable time (time you charge to clients)
2. business-development time (time spent drumming up new business)
3. professional-development time (time spent in training or at seminars)
4. nonbillable time (vacations, sick days, and so forth)
5. suspended time (a catchall for time you cannot verify because of lost time sheets and the like)

Once you have a plan, you enter the percentage of time you want the staff to spend on each category. The percentages belong in the unprotected cells in column F of the figure. Next, you must determine the hours the staff actually spent on each activity in a recent month. You enter this data in the unprotected cells in column D.

The total hours the staff worked depends, of course, on the number of employees, the hours in the workweek, and the length of the month. When you count employees, you can use decimals for part-time employees or staff who joined the firm part way through the month. Enter the number of employees in cell F3, the number of weeks in the month in cell H3, and the number of hours in a workweek in cell J3.

Formulas in column E return productivity percentages based on your plan's percentages. Columns G and H make adjustments for time lost to sickness, vacations, and so forth and return adjusted productivity percentages. Row 40 presents time and percent totals for each worksheet column.

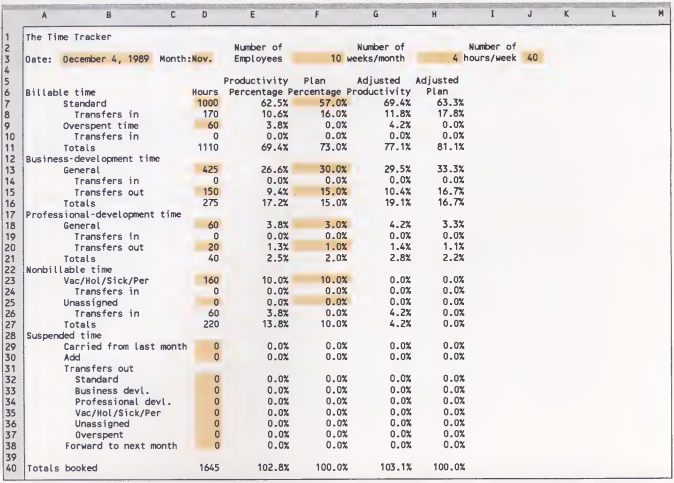
TRANSFER OF TIME IS KEY

Each worksheet section contains cells that allow time to be transferred to or from other sections. The ability to transfer time among sections converts the worksheet from a database to a useful analysis tool.

For example, some firms negotiate contracts so that they can invoice their clients for business development. Cell D15 contains the hours that can be transferred from business development to billable time as contracts are won. To discourage people from wasting time on poor leads or personal crusades, development time that does not yield a contract stays in the development account. The worksheet allows you to carry development time forward indefinitely. As a result, a transfer can occur several months after a proposal is made.

THE FIVE WORKSHEET CATEGORIES

The billable-time category collects all the time charged to authorized contracts. Consistently high values in cell D7, which is standard, billable time, show that business is



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	The Time Tracker												
2					Number of		Number of		Number of				
3	Date:	December 4, 1989	Month:Nov.		Employees	10	weeks/month	4	hours/week	40			
4													
5					Productivity	Plan	Adjusted	Adjusted					
6	Billable time			Hours	Percentage	Percentage	Productivity	Plan					
7	Standard			1000	62.5%	57.0%	69.4%	63.3%					
8	Transfers in			170	10.6%	16.0%	11.8%	17.8%					
9	Overspent time			60	3.8%	0.0%	4.2%	0.0%					
10	Transfers in			0	0.0%	0.0%	0.0%	0.0%					
11	Totals			1110	69.4%	73.0%	77.1%	81.1%					
12	Business-development time												
13	General			425	26.6%	30.0%	29.5%	33.3%					
14	Transfers in			0	0.0%	0.0%	0.0%	0.0%					
15	Transfers out			150	9.4%	15.0%	10.4%	16.7%					
16	Totals			275	17.2%	15.0%	19.1%	16.7%					
17	Professional-development time												
18	General			60	3.8%	3.0%	4.2%	3.3%					
19	Transfers in			0	0.0%	0.0%	0.0%	0.0%					
20	Transfers out			20	1.3%	1.0%	1.4%	1.1%					
21	Totals			40	2.5%	2.0%	2.8%	2.2%					
22	Nonbillable time												
23	Vac/Hol/Sick/Per			160	10.0%	10.0%	0.0%	0.0%					
24	Transfers in			0	0.0%	0.0%	0.0%	0.0%					
25	Unassigned			0	0.0%	0.0%	0.0%	0.0%					
26	Transfers in			60	3.8%	0.0%	4.2%	0.0%					
27	Totals			220	13.8%	10.0%	4.2%	0.0%					
28	Suspended time												
29	Carried from last month			0	0.0%	0.0%	0.0%	0.0%					
30	Add			0	0.0%	0.0%	0.0%	0.0%					
31	Transfers out												
32	Standard			0	0.0%	0.0%	0.0%	0.0%					
33	Business devl.			0	0.0%	0.0%	0.0%	0.0%					
34	Professional devl.			0	0.0%	0.0%	0.0%	0.0%					
35	Vac/Hol/Sick/Per			0	0.0%	0.0%	0.0%	0.0%					
36	Unassigned			0	0.0%	0.0%	0.0%	0.0%					
37	Overspent			0	0.0%	0.0%	0.0%	0.0%					
38	Forward to next month			0	0.0%	0.0%	0.0%	0.0%					
39													
40	Totals booked			1645	102.8%	100.0%	103.1%	100.0%					

This time-management worksheet shows how efficiently a firm uses time. Planned time-allocations are entered in the unprotected cells in column F. Hours from time sheets are entered in the unprotected cells in column D. Formulas in column E calculate percentages from the hours the staff actually worked. These percentages can then be compared to plan percentages in the adjacent cells in column F. Formulas in columns G and H use approved leave time and compensate productivity percentages. Total hours and overall productivity percentages appear in row 40.

strong. Low values indicate that reductions in staff may be necessary. High values in cell D9, which is overspent time, show that lots of time is spent on projects that take longer to complete than planned. Pricing and review procedures, as well as project management, may need to be improved.

Cells D8 and D10 receive transfers to billable time from other categories. Transfers in cell D8 represent time recovered from business development, professional development, or suspended time. Transfers in cell D10 represent transfers of overspent time from suspended time.

The business-development category collects the time spent on identifying and evaluating new business and the time required to prepare proposals. This is speculative time: Some of the work will pay off, some will not. Cell D13 contains the number of hours spent on business development.

The professional-development category collects the time spent on training and education. You enter the hours in cell D18. Although many professionals do not consider professional-development time billable, the time spent on training is an investment in future business. For example, taking a course in desktop publishing may lead to winning a desktop-publishing contract. Consequently, in this worksheet you can use cell D20 to transfer a portion of professional-development time to billable time.

The nonbillable category collects time charged to vacations, holidays, sickness, or approved personal time. It also provides for an entry for unassigned time. You use this entry to record time lost due to weather, jury duty, and so on. Like other worksheet sections, this section provides for the transfer of time.

The suspended-time category collects time you cannot charge to other sections. Usually this is due to missing or incomplete time sheets. If someone forgets to submit a time sheet, you enter the missing hours in cell D30. Then, assuming you get the time sheet by the next month, you enter the hours in cells D32 through D36. If any time was overspent, you enter it in cell D37.

Every month, the beginning value in cell D29 is the amount of suspended time brought forward from the previous month. The value in cell D38 is the amount carried forward to next month.

Cells F7, F13, F15, F18, F20, F23 and F25 contain percentages from your time-allocation plan. Cells in column F provide for time transfers from the business-development and professional-development categories to the billable category. No provisions are made for intentionally allocating suspended or overspent time.

Note that the percentages returned in columns G and H are higher than those returned in columns E and F. That's because the calculations in columns E and F are based on the total hours anticipated for the month, while the calculations in columns G and H are based on the hours actually worked. In essence, the formulas in columns G and H adjust percentages so that productivity ratings do not suffer because of vacations, holidays, sickness, or approved personal leave.

TO USE THE MODEL

Begin by entering in cell B3 the date you prepare the productivity worksheet. Enter this date as a label rather than as a date serial number in an @NOW function. This keeps the date from changing each time you load the worksheet.

In cell D3 enter the month the worksheet tracks. In cell F3 enter the number of employees, and in cell H3 the number of weeks in the month being tracked. In cell J3 enter the number of hours in your workweek.

In the unprotected cells in column F enter the time percentages derived from your plan. Enter in cell F7 the percentage of time planned for billable work. Enter in cell F13 the percentage planned for pursuing new business. For example, in the figure we assume we'll spend 30% of our time pursuing new business.

You won't win every contract you go after, so enter in cell F15 the percentage of time you expect to transfer from business development to billable work. In the figure we assume we will win half the contracts we bid on. Thus, we enter 15% (half of 30%) in cell F15.

Make similar entries in the professional-development section. In cell F18 enter the percentage of time you plan to spend on professional development. In cell F20 enter the percentage of time you expect to transfer to billable time.

The nonbillable-time section accepts two entries. In cell F23 enter the percentage of time planned for vacations, holidays, sick days, and personal days. For example, if the month being tracked has two holidays out of a possible 20 working days, enter 10% in cell F23. Next, you can enter the percentage of time you expect to lose to unforeseen circumstances, such as jury duty, in cell F25. In the figure we assume no time will be lost to unforeseen circumstances.

In the suspended-time section, 0% appears in range F29..F38. That's because the worksheet does not provide for planning suspended time (since you do not plan to lose time sheets).

Once you've entered plan percentages in column F, look at cell F40. A formula in this cell calculates the total percentage, which should be 100%. If it is more than 100%, trim the percentages. If it is less, increase the percentages.

For example, in a month with two holidays, you may need to reduce the percentage for billable time in cell F7. This is because there is less time available for billable work than there is in a month with no holidays.

Once you've entered the percentages in column F, you enter the hours recorded on your time sheets in column D. Enter in cell D7 the hours your firm spent on billable work, and in cell D9 the number of overspent hours. Enter in cell D13 hours spent on business development, and in cell D15 the hours of business development you can transfer to billable time.

Enter in cell D18 professional-development time, and in cell D20 enter the amount of this time you can transfer to billable time. Enter in cell D23 the time used for vacations and the like, and in cell D25 enter any unassigned time.

If you have all the completed time sheets you need, you do not need to make any entries in suspended time. In our figure, no suspended time is carried forward from the previous month or recorded for the current month. Subsequent months, however, may be different.

When a time sheet is missing, enter the number of hours it represents in cell D30. If your workweek is based on 40 hours, enter 40. You must carry this total forward to the next month. Once you have the time sheet in hand, assign data from it to the various categories for suspended time in range D32..D37. This ensures that the data is transferred to the right cells.

INTERPRETING THE RESULTS

The worksheet provides insight into how efficiently your firm is functioning. For example, compare cells F7 and E7 to see how close you are to your target for billable time. The firm in our figure exceeded its productivity target by 5.5 percentage points.

Another important consideration is overspent time. In our figure cell E9 reveals that the staff spent 3.8% more time on projects than planned. Some projects may be taking too long to complete.

Compare cells E13 and F13 to see how close you are to your business-development target. In our figure the numbers indicate that the firm spent less time than planned soliciting new business. Cells E15 and F15 are especially telling. Far fewer hours than planned (9.4% versus 15%) were transferred from business development to billable time. If this keeps up, there could be lean times ahead.

Comparing cells E18 and F18 in our figure shows that the staff spent more time on professional development than planned. But cells E20 and F20 show that the firm realized an appropriate return on this time.

In the nonbillable category, our figure shows 160 hours in cell D23. This represents a two-day Thanksgiving holiday, or 16 hours, for 10 people. Comparing cells E23 and F23 shows the absence was expected. Since no time was lost unexpectedly, cells E25 and F25 each return 0%.

In our figure the cells in suspended time are filled with zeros. That is because the first time you use the worksheet there will be no suspended time carried forward from previous months.

The totals in row 40 give the bottom line on the firm's performance. In our figure cell D40 logs a total of 1,645 hours. Cell E40 rates productivity at 102.8%.

How can productivity be greater than 100%? Simple. Some people put in extra hours. A normal month is 1,600 hours (10 staff × 8 hours a day × 20 business days). Cell D40 shows 1,645 hours were logged. The extra 45 hours, therefore, pushed the productivity rating to 102.8%. Cells G40 and H40 adjust the plan and the productivity rating to take the two-day holiday into account. That adjustment pushes the productivity rating to 103.1%.

EXPANDING THE CONCEPT

This time-management system is basic. You could expand it several ways. For example, you could divide business development into a number of categories in order to track development more closely. Or you could put vacations, holidays, sick days, and personal days in separate categories in order to take a closer look at personnel policies.

Use the worksheet a few months, then modify it to meet your firm's specific needs. Each monthly report will give you a snapshot of how the staff is using its time. Several reports will reveal trends and highlight areas that need attention. ■

HOW TO SET UP THE TIME-MANAGEMENT WORKSHEET

1. Individual column widths

Column	Width	Column	Width
A	7	F	11
B	18	G	12
C	6	H	10
D	6	I	11
E	12	J	4

For example, to set the width of column A, position the cell pointer in column A, select

1-2-3: /Worksheet Column Set-Width, enter 7
Symph: MENU Width Set, enter 7

2. Labels

Enter the labels shown in the figure. Precede the labels in range B32..B37 and the labels in the following cells with two spaces: B8, B10, B14, B15, B19, B20, B24, and B26. Precede the labels in range D5..H6 and cell G3 with a caret (^). Precede the labels in range E2..I3 with quotation marks.

3. Values

Enter the values shown in the following cells: F3, H3, J3, D7, F7, D9, D13, F13, D15, F15, D18, F18, D20, F20, D23, and F23. Enter the value shown in cell F9 and copy cell F9 to the following cells and ranges: F10, H9..H10, G23..H24, D25, F25, D29..D30, F29..F30, H29..H30, D32..D37, F32..F37, and H32..H37.

4. Range names

Name	Range
empl	F3
weeks	H3
hours	J3

For example, to assign the range name *empl* to cell F3, press slash (*Symph:* MENU), select Range Name Create, enter *empl*, and indicate cell F3

5. Enter and copy formulas

Cell **Formula**

E7 `+D7/($empl*$weeks*$hours+$D$29+$D$30-@SUM($D$32..$D$37)-$D$38)`

Copy cell E7 to the following cells and ranges: E9, E13, E15, E18, E20, E23, E25, E29..E30, and E32..E37.

G7 `+E7/(1-$E$23-$E$24)`

Copy cell G7 to cells and ranges: G9, G13, G15, G18, G20, G25, G29..G30, and G32..G37.

H7 `+F7/(1-$F$23)`

Copy cell H7 to cells: H13, H15, H18, H20, and H25.

D8 `+D15+D20+D32`

Copy cell D8 to range E8..H8.

D10 `+D37`

Copy cell D10 to cells E10 and G10.

D11 `+D7+D8-D9-D10`

Copy cell D11 to range E11..H11.

D14 `+D33`

Copy cell D14 to range E14..H14.

D16 `+D13+D14-D15`

Copy cell D16 to ranges E16..H16 and D21..H21.

D19 `+D34`

Copy cell D19 to range E19..H19.

D24 `+D35`

Copy cell D24 to range E24..F24.

D26 `+D9+D10+D36`
D27 `@SUM(D23..D26)`

Copy range D26..D27 to range E26..H27.

D38 `+D29+D30-@SUM(D32..D37)`

Copy cell D38 to range E38..H38.

D40 `+D11+D16+D21+D27+D38-D29`

Copy cell D40 to range E40..H40.

6. Cell formats

Format	Range
Percent 1	E7..H40

For example, to set the format for range E7..H40, select

1-2-3: /Range Format Percent, enter 1, and indicate range E7..H40
Symph: MENU Format %, enter 1, and indicate range E7..H40

7. Cell protection

Enable global worksheet protection. To enable worksheet protection, select

1-2-3: /Worksheet Global Protection Enable
Symph: SERVICES Settings Global–Protection Yes Quit

Unprotect the following cells and ranges: B3, D3, F3, H3, J3, D7, F7, D9, D13, F13, D15, F15, D18, F18, D20, F20, D23, F23, D25, F25, D29..D30, and D32..D37.

For example, to unprotect cell B3, select

1-2-3: /Range Unprotect, indicate cell B3
Symph: MENU Range Protect Allow–Changes, indicate cell B3

LOTUS Models on CompuServe

The models we have published in the magazine this year to date can now be downloaded from CompuServe. As we promised last month, here are instructions on how to get the ones you want.

You must have a modem and a communications program, of course. We also assume that you are a CompuServe subscriber and that you are a registered member of the Lotus Spreadsheet Products Forum (until recently known as the Lotus Integrated Forum). If either is not the case, please read the accompanying instructions on how to join.

If you're an experienced CompuServe user, you'll find much of the information here to be old stuff.

The easiest way to find a model is to know what issue it appeared in. Each month's *1-2-3* models are collected in a single file that is archived, or crunched, to minimize its size and your phone bill. Similarly, each month's *Symphony* models are collected in a single file.

So, to download a model, you have to download the file for that issue. Then you have to extract the individual files from the archive file. You need a special utility program called *Arce.exe* that you can also download from CompuServe. We'll tell you later how to get the utility. It is easy to use. To extract the models from an archive file named M18904.ARC, for example, the command is Arce a:M18904 (assuming the archive file is in your A drive).

When you do this, you will get several WK1 or WR1 files and a DOC file. The DOC file is an ASCII text file that you can read in DOS with a TYPE command. You can print it with a redirection command—for example:

```
type m18904.doc>prn
```

For each template, the file explains the purpose and lists the page number of the article in which the template appears. Where appropriate, it also notes readers' comments on the template that were received by the editors prior to the upload date.

TO GET A FILE

When you see CompuServe's main menu on the screen, enter *go lotusa* at the prompt. The main menu for the Lotus Spreadsheet Products Forum, which is concerned with *1-2-3* and *Symphony*, appears. To access *LOTUS* magazine models:

1. Enter 3—for LIBRARIES—at the prompt. The menu for the forum's libraries will appear.
2. Enter 10—for *LOTUS* magazine—at the prompt. The menu for the forum's Library 10 will appear.

At this point, you can choose to view a directory of files, which contains no information about individual templates in a file, or to browse through an expanded directory that contains a short paragraph about the contents of each file.

To see the directory, enter 2. You will see a list of file names. Beside each file name is the upload date, the byte size, and a note indicating how many times that file has been accessed.

All *LOTUS* magazine file names start with M, for *magazine*. The second character is either 1, for *1-2-3*, or S, for *Symphony*. The third and fourth characters stand for the year—for example, 89. The fifth and sixth characters stand for the month—for example, 04 for April. So the name of the file containing *1-2-3* templates from the April 1989 issue is M18904.

If you find a file you want, make a note of the file name. Then, at the prompt, enter *download*, or *dow* for short. At the next prompt, enter the file name. CompuServe then asks you to choose a binary transfer protocol from a short menu. Your communications program probably supports the XMODEM protocol; if so, select menu option 1. Then CompuServe waits for you to set up your communications program to receive a file. Typically, you will have to issue a local "receive" command naming the transfer protocol (in *Crosstalk XVI*, for example, RX) and indicate the name you want to give the file and the disk that will receive it. When that is done, the file transfer begins.

The directory option is fine when you know the issue you want. If you don't know the issue, or if you want to know more about what templates are available, choose 1 for BROWSE on the Library 10 menu. You will be asked to specify a subject keyword. If you do not want to limit your browsing, enter *all*. You will then see the first page of a list that contains five- to six-line summaries of the group of *1-2-3* templates in each issue and similar summaries of the *Symphony* templates in each issue. You can page through the list. Each screen contains just one summary. If, while a summary is on the screen, you decide you want that file, enter *download*, or *dow*. You won't have to enter the file name; otherwise, proceed as above.

If you want to be more selective in your browsing, enter one or more keywords at the initial BROWSE prompt. All files carry keywords for the month and year of issue and for either *123* (the keyword list drops the hyphens) or *Symphony*. So if you enter 1989 123, you will be shown only the summaries of 1989 files containing *1-2-3* templates. If you add the word *accounting*, what you see will be further restricted. If you do type more than one keyword, put a space between them.

To download the file extraction program, enter *lib2* at the prompt while viewing the main menu for the Lotus Spreadsheet Products Forum. At the next prompt, enter *dow arce4c.exe* and then proceed as usual to set your communications program to receive a binary transfer. The file you receive expands itself into two files when you enter its name at the DOS prompt. One of the resulting files is the utility you want; the other is an ASCII text file that describes its use.

IF YOU'RE NOT A MEMBER

If you're not a CompuServe subscriber, it's easy to become one. Just phone 800-848-8990 and ask for representative 146. If you're not in the United States or Canada, phone 614-457-0802 instead. You will get a sign-up package and a $15 credit against your connect-time charges. Connect time costs $12.50 per hour.

Even if you're a CompuServe subscriber, you can't make full use of the Lotus Spreadsheet Products Forum without registering there: You'll be able to read messages but you won't be able to download files. Registering as a member of the Lotus Spreadsheet Products Forum won't cost you anything extra. At the main menu for the forum you'll see a final choice that invites you to join. Pick that choice, follow the instructions, and you're on your way. ○

Q&A

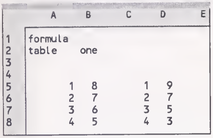
ANSWERS TO YOUR QUESTIONS ABOUT LOTUS PRODUCTS

1-2-3/SYMPHONY

@@ AND @VLOOKUP

Q. I use a spreadsheet that contains several depreciation schedules drawn from different depreciation methods. I'd like to be able to enter the name of a depreciation method and have an @VLOOKUP function return a value from the corresponding table.

For example, consider the tables in columns A and B, and C and D of the following figure:



	A	B	C	D	E
1	formula				
2	table	one			
3					
4					
5	1	8	1	9	
6	2	7	2	7	
7	3	6	3	5	
8	4	5	4	3	

In cell B1 I'd like an @VLOOKUP formula that returns a value from the table in columns A and B when cell B2 contains the label *one*, and that returns a value from the table in columns C and D when cell B2 contains the label *two*.

Ken Shuck
Nash Finch Co.
Grand Island, Nebr

A. Enter the formula @VLOOKUP (3,@@(B2),1) in cell B1. The part of the formula that you had not discovered is the @@ function, which is an indirect reference to a cell or a range. The expression @@(B2) means "the range named in cell B2."

We've assigned the name *one* to range A5..B8, and the name *two* to range C5..D8. When cell B2 contains the label *one*, the @VLOOKUP function refers to range A5..B8. Likewise, when cell B2 contains the label *two*, the @VLOOKUP function refers to range C5..D8.

As the formula in cell B1 stands, it finds the selector value of 3 (cell A7), and an offset of 1 (cell B7) from the column range that is named *one*. In order to create a more flexible lookup function, modify the @VLOOKUP formula in cell B1 so that it refers to a cell with a range name as its selector value.

FREQUENCY DISTRIBUTION

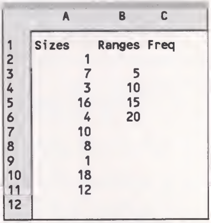
Q. I often import into *1-2-3* data that represent sizes of objects. I want to sort and analyze the data in such a way that *1-2-3* will list how many items fall within specific ranges.

For example, the following table shows a column of sizes, a list of possible size ranges, and a list of the number of data points that fall within each range. Can *1-2-3* generate the list of frequencies for me?

Sizes	Ranges	Frequencies
1		
7	0–5	4
3	6–10	3
16	11–15	1
4	16–20	2
10		
8		
1		
18		
12		

Peter L. Haaker
Department of Fish and Game
Long Beach, Calif.

A. Both *1-2-3* and *Symphony* can generate a list of frequencies. Arrange your data in the worksheet much as you have in your illustration. Put all the sizes in one column and list the size ranges in an adjacent column. However, you should list only the upper limit of each range that you want represented. The illustration at the top of the next column shows how your worksheet should appear.



	A	B	C
1	Sizes	Ranges	Freq
2	1		
3	7	5	
4	3	10	
5	16	15	
6	4	20	
7	10		
8	8		
9	1		
10	18		
11	12		
12			

Now, select /Data Distribution (in *Symphony*, select MENU Range Distribution) and indicate range A2..A11 as the Values range. Indicate range B3..B6 as the Bin range.

Column C lists how many values in column A are less than or equal to the adjacent values in column B. The last value in column C (in this example, cell C7) indicates how many values, if any, are greater than the last value in column B.

PRINT COLUMN LETTERS AND ROW NUMBERS

Q. Is there some way to print the worksheet's frame along with a worksheet range?

Mark Milnac
Simpsonville, S C

A. *1-2-3* Release 3 provides a menu option that lets you print the worksheet's frame along with a Print range. Select /Print Printer Options Borders Frame. To stop printing the frame, select /Print Printer Options Borders No-Frame.

No other release of *1-2-3* or *Symphony* has this feature. However, you can press the PrintScreen key to print a rough draft of your screen.

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RIGHT-ALIGNED UNDERLINES

Q. *1-2-3* seems to reserve a blank character space at the right end of a cell. For example, when I enter the characters *"apple*, the word doesn't align with the right side of the cell. Rather, there is a space between the *e* in apple and the cell's right border.

This causes problems with a report that I print every month. As you can see in the following worksheet, the underlines that I created by entering hyphens appear incorrectly aligned.

```
         A         B       C         D

1       8.0      4.0     50%
2       9.0     (2.3)    25%
3       4.0      0.4     10%
4       7.0     (1.1)    15%
5      -----    -----   -----
```

Is there any way to extend each underline to the right end of a cell?

Kim Bussy
New York Power Authority
Grand Gorge, N.Y.

A. We could reproduce your problem if we entered the values, entered the underlines, then formatted some of the ranges, in that order. Change the order. Enter the values, format the ranges, then enter the underlines.

If you want to start the underline at the cell's left edge, enter a backslash and a hyphen (\–). Dashes will appear across the entire width of the cell.

If you want to leave spaces ahead of the dashes as you've done in your example, start the underline by pressing the Spacebar several times. Then type as many dashes as needed to fill out the cell. For example, if the cell has a width of nine characters and you want a five-character underline, you press the Spacebar four times, then type five dashes.

Creating an underline in this way may seem like busywork. However, if most of your worksheet's columns are one width, you can create the underline once and then copy it to any cells.

FIND A TABLE ENTRY

Q. I've created a table similar to the one shown in range A5..E9 in the figure to the right. I'd like to find a formula that can return a value from the table based on entries made in cells B1 and B2. For example, if I enter the label *July* in cell B1 and *Green* in cell B2, the formula in cell E1 should return 8.

```
        A          B       C        D       E

1   Month: July             Answer:         8
2   Color: Green
3
4
5              June     July   August  Total
6   Red           1        2        3      6
7   Blue          4        5        6     15
8   Green         7        8        9     24
9   White        10       11       12     33
```

Morie Mehyou
Little Rock, Ark

A. In cell E1 enter the following formula, which uses both vertical and horizontal table-lookup operations:

```
@VLOOKUP(B2,A5..E9,
  @HLOOKUP(B1,A5..E9,0))
```

The @VLOOKUP function has the syntax @VLOOKUP(*item,range,col_offset*). The function searches the leftmost column of *range* for *item*. When it finds *item* in *range*, the function returns the entry that is *col_offset* columns to the

What Can a Spreadsheet Compiler Do for You?

If your answer is that a spreadsheet compiler can create templates that run without Lotus 1-2-3, hide macros and formulas from end users, and configure colors and borders, you are only half right.

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- support both expanded and virtual memory to allow large worksheets to run
- have a high degree of compatibility with Lotus 1-2-3 and be very easy to use
- provide a symbolic debugger to assist application development
- customize the appearance of applications with context-sensitive help and vertical menus
- allow you to program part of your application in the C language
- support sideways printing

You can buy a spreadsheet compiler without any of these features, or buy one that has them all. Let the table help you decide.

	Templates run w/o 1-2-3	Secures macros and formulas	Compiles macros	Minimal recalc	Expanded memory	Symbolic debugger	Context-sensitive help	Virtual memory	Sideways printing	User defined functions	Macro loop 3000 times*
King Jaguar	●	●	●	●	●	●	●	●	●	●	:21
Jaguar	●	●	●	●	●	●	●				:21
@ Liberty™ (2 01)	●	●									2:09
1-2-C (1 5)	●	●									3:49
Baler™(4 0)	●	●									7·01
Lotus 1-2-3® (2 01)				●	●						4.17

*Tested on an 8086 system

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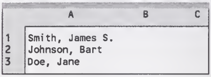
right of the found value. In this formula, the *col_offset* argument is an @HLOOKUP function.

The @HLOOKUP function has the syntax @HLOOKUP(*item,range,row_offset*). It searches the top row of *range* for *item*. When it finds *item* in the top row, the function returns an entry that is *row_offset* rows down from the found value. If *row_offset* is 0, the function returns a value that identifies the location of the found value. In our worksheet, the formula @HLOOKUP("July",A5..E9,0) returns 2, because the argument *row* is 0, and the label *July* is two columns from the leftmost column of the table.

The @HLOOKUP function determines which column of the table contains the desired value. The @VLOOKUP function determines which row of the table contains the desired value, and then it uses the result of the @HLOOKUP function to return a value from the appropriate column. You must enter the labels in cells B1 and B2 exactly as they appear in the table; otherwise the formula evaluates to ERR. Make sure that you don't accidentally add unnecessary spaces. In addition, if you enter in either cell B1 or B2 a label that isn't in the table, the formula evaluates to ERR.

SEPARATING LABELS

Q. I need help in developing a formula that extracts specific characters from a label. I have a list of labels as shown in the following illustration:



```
          A                    B       C
1   Smith, James S.
2   Johnson, Bart
3   Doe, Jane
```

What formula will return all the characters up to, but not including, each comma? Also, what formula will return all the characters that *follow* the space after each comma?

Frank Zampella
Genentech Inc.
San Francisco, Calif.

A. In cell B1 enter the formula @LEFT (A1,@FIND(",",A1,0)). In cell C1 enter the formula @MID(A1,@FIND(",",A1,0) +2,240). Copy these formulas down columns B and C, as needed.

The @LEFT function has the syntax @LEFT(*label,number*), where *label* identifies a label or a cell that contains a label. The function returns *number* sequential characters, beginning with the leftmost character of *label*.

The @FIND function returns a number that identifies one string's position within another string. The function's syntax is @FIND(*search,source,number*). *Search* identifies one or more characters to find within *source*. *Number*, which starts counting at 0, identifies the position within *source* from which the search should begin. For example, the formula @FIND("e","abcdefg",2) returns 4.

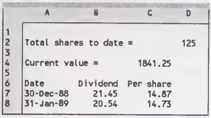
The @FIND function in the first formula finds the comma within the label in cell A1 and returns 5. This becomes the @LEFT function's *number* argument. The formula in cell B1 returns five characters from the left end of the label in cell A1.

The @MID function in the second formula returns a specific number of sequential characters from within a string. The function has the syntax @MID (*source,start,length*). *Source* identifies the string from which to return characters. *Start*, which begins counting at 0, identifies the position of the first character to return from within *start*. *Length* identifies the number of characters to return.

In our formula, *source* is cell A1. *Start* is the expression @FIND(",",A1,0)+2, which identifies the character that is two positions to the right of the comma. The *length* expression is 240. This arbitrary higher value ensures that the formula will return all the characters to the end of the string.

WHAT'S THE LAST ENTRY?

Q. Is there some way for a formula to use the last value entered in a column in its calculation? The worksheet below illustrates my problem:



```
       A           B          C         D
1
2   Total shares to date =             125
3
4   Current value =        1841.25
5
6   Date        Dividend  Per share
7   30-Dec-88     21.45     14.87
8   31-Jan-89     20.54     14.73
```

The formula in cell C4 must multiply the value in cell D2 times the last value in column C—in this case, 14.73. But at the end of next month, I'll enter a value in cell C9. Then the formula should calculate the product of cell D2 times cell C9.

Bob Carson
Holland, Mich.

A. The following formula in cell C4 should solve your problem:

@INDEX(C7..C20,0,
 @COUNT(C7..C20)−1)*D2

The @INDEX function has the syntax @INDEX(*range,col,row*). It returns a value that is *col* columns to the right and *row* rows down from the cell in the top-left corner of *range*. In our example the @INDEX function's argument *range* is C7..C20. If you feel that you'll enter more than 14 records into your model, extend this range downward as far as you think is necessary.

In any case, the function returns a value that is 0 columns to the right of the first column of the range and that is @COUNT(C7..C20)−1 rows down from the top row of the range. The expression @COUNT(C7..C20)−1 identifies the location of the last entry in the column.

Make sure that there aren't any gaps in the entries in range C7..C20. Gaps will cause the formula in cell C4 to evaluate to ERR.

1-2-3

LABELS IN FORMULAS

Q. I use *1-2-3* Release 1A to keep track of cash receipts and disbursements. I enter data in one section of the worksheet, and formulas replicate the entries in other sections.

Wherever I enter numeric data, formulas reproduce the entries without a hitch. For example, the formula +A1 entered in cell Z1 returns the value stored in cell A1. However, when I enter labels in the worksheet's input area, the formulas fail to reflect the entries. For example, the formula +B1 in cell Z1 returns 0 when cell B1 contains the label *Portny, Ralph.*

Is there an easy way to replicate newly entered data as I've described? I'll upgrade to a later release of *1-2-3* if that's the only solution to my problem.

A. J. Chetfetz, CPA
Phoenix, Ariz.

A. Upgrading isn't the only way to solve your problem, but depending on your macro-writing prowess, it might prove the easier solution. Each label in *1-2-3* Release 1A has a numeric value of 0. No formula can return the actual label. To replicate a single label entry in several cells, you must write a macro that copies

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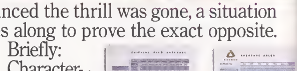

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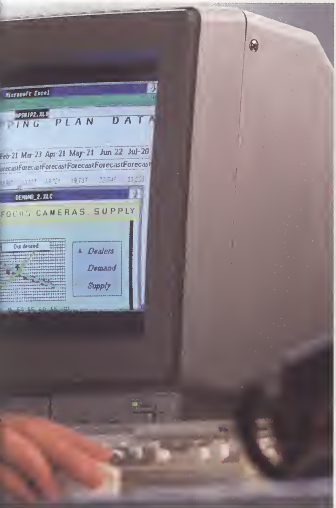

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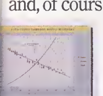

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the original entry. In all later releases of *1-2-3*, formulas will return labels.

DISPLAY ZEROS AS DASHES

Q. When we prepare a spreadsheet, we must replace each zero with a single dash aligned with the rightmost digit in the column. To make the task easier, we maintain two sections of the spreadsheet. One section contains the actual data, the other contains @IF formulas that replace zeros with dashes.

Doubling the size of the spreadsheet takes a lot of memory. *1-2-3* Release 2/2.01 lets you select /Worksheet Global Zero Yes to suppress the display of zero-valued cells without a loss of memory. Is it possible to modify this command so that the software replaces zeros with dashes?

Kathy A. Kempke
Ambrosia Chocolate
Milwaukee, Wis.

A. Unfortunately, *1-2-3* Release 2/2.01 doesn't offer the option you've requested. Adding a section of @IF formulas, as you're currently doing, is probably the simplest solution to your problem. *1-2-3* Releases 2.2 and 3 let you indicate what label to display in place of zero values.

SYMPHONY

SELECT BLANK FIELDS

Q. We use a *Symphony* Release 2.0 database to keep track of various projects. Sometimes we wish to print a report on all unfinished projects. One of the database fields is named *Completed*, and to indicate an unfinished project, we leave this field blank. We've been unable to create a criterion formula that selects all records that have the *Completed* field blank. Is there such a formula?

A W Pemberton
Daytona Beach Community College District
Daytona Beach, Fla

A. Enter the following formula in the *Completed* field in your Criterion range:

@CELL("type",completed) = "b"

This criterion formula will match only records that have the *Completed* field blank. In the Database range, the first cell under the field name *Completed* is named *completed*. In a database record, if the field named *Completed* contains a label-prefix character and only appears to be blank, this criterion formula will not select the record.

The @CELL function has the syntax @CELL(*attribute, range*). *Range* identifies a cell or range about which you wish to know some information. In *Symphony* Release 2.0 *range* can be a range reference or a single cell reference. It can also be a named range. *Attribute* identifies the information you wish to know about *range*. When *attribute* is "type," the @CELL function returns any of three characters. The function returns *l* if *range* contains a label, *v* if *range* contains a value or a formula, and *b* if *range* contains no entry.

Our criterion formula means "match every record for which the function @CELL("type",completed) returns *b*."

REVISITED

PROBLEM UNDERLINING CHARACTERS

Q. I used the technique described in the March Q&A entitled "Underlining Characters in the Same Cell." The technique does, in fact, underline characters. The resulting printout, however, doesn't always meet my expectations.

When I print a range that contains an underlined entry in the leftmost cell of a row, every entry in that row and to the right of that cell moves to the left on the printout, throwing off the column alignment. Why is this happening?

Sonny Jones
Springfield, Va.

A. In the March issue we explained that you can underline characters in a label by using the COMPOSE key to create a merge character. For example, to enter the letter A in cell A1 so that it will print with an underline, type the letter, press the COMPOSE key, and type *mg*. Finally, type an underline and press Return. When you print cell A1, the letter A will appear underlined on the printout.

If you also have entries in cells B1, C1, and so on, they will now be printed two characters to the left of where they appear on the display. Two things cause the data to be offset.

First, the merge character that you produce when you press COMPOSE and type *mg* simply causes your printer to backspace and type a second character over the first one. The printer then prints the balance of the current line. The backspacing accounts for half of the two-character offset seen on the printout.

Second, since *1-2-3* and *Symphony* don't actually print the merge character, the printed text in the line following that character moves to the left to fill in the space that the merge character occupies on your display.

For each character that you underline at the left end of a row, expect all characters that follow to be offset two characters to the left. To work around the problem, use underlines of this type only for labels that fall at the right side of the Print range. As an alternative, place two spaces per underlined character before any label that follows an underlined label. Although this makes a worksheet look wrong on the display, the printout will be aligned as you desire.

This method does not work in *1-2-3* Release 3.

PRINT IN COLOR

Q. In the April issue you informed James Anderson that *1-2-3* and *Symphony* can't print in color on his Epson EX-1000 printer. In fact, you *can* print in color. The setup string \027\114\001 produces magenta text; the string \027\114\002 produces cyan, or blue; and the setup string \027\114\006 produces green text.

Tim Fitzpatrick
Batavia, Ill.

A. We were wrong. To embed setup strings in your worksheet, move the cell pointer to the leftmost column of the range you intend to print. Then in a blank row enter the setup string preceded by two split vertical bars (¦¦). Any text that's entered between this setup string and the next one will print in the color that the first setup string represents.

CONTEST

AUGUST CONTEST RESULTS

In the August issue we asked users of *1-2-3* and *Symphony* to submit the best method to convert a base 10 (decimal) positive integer value ranging from 0 to 255 to its base 2 (binary) equivalent. For example, if you enter the value 123, your method should return 01111011.

Some contestants wrote macros and others used lengthy @VLOOKUP tables. Although these methods work, a one-formula solution is preferable because it does the job faster and more efficiently.

The winning formulas met two conditions: To match our example, they returned a result that had a leading zero. And they returned ERR if the decimal value was outside the range 0 to 255.

The winning solution, which appears below, is a formula whose structure is based on the @CHOOSE and @MOD functions. In the formula, cell A1 refers to the decimal value.

```
@CHOOSE(A1/64,"00","01",
  "10","11")&@CHOOSE
  (@MOD(A1/16,4),"00",
  "01","10","11")&@CHOOSE
  (@MOD(A1/4,4),"00","01",
  "10","11")&@CHOOSE(@MOD
  (A1,4),"00","01","10","11")
```

The @CHOOSE function returns a value selected from a list of possible results. It has the following syntax: @CHOOSE (*selector,result0,result1,result2,result3,...*). The function evaluates *selector* and returns the quantity whose position in the list of results coincides with the value of *selector*. The @CHOOSE function evaluates only the integer portion of *selector*.

The @MOD function has the syntax @MOD(*numerator,denominator*). The @MOD function divides *numerator* by *denominator* and returns the remainder.

Binary numbers use only two digits, 0 and 1, which derive their meaning from their position. Each position in a binary number represents a power of 2. The rightmost digit represents 1's, the next digit to the left represents 2's, and so on. The following table illustrates the conversion of decimal numbers to binary numbers:

Decimal	**Binary**
2^0=1	00000001
2^1=2	00000010
2^2=4	00000100
2^3=8	00001000
2^4=16	00010000
2^5=32	00100000
2^6=64	01000000
2^7=128	10000000

To return one of the possible combinations, the @CHOOSE function uses a number between 0 and 3 as the selector value. Each of the combinations (00, 01, 10, 11) represents a two-digit portion of the eight-digit number. A binary number can be converted to a decimal number by using the formula $n1*64+n2*16+n3*4+n4$, in which n is a binary representation of each two-digit portion.

Let's discuss the four components of the formula based on our example decimal number, 123:

@CHOOSE(A1/64,"00","01","10", "11") evaluates 123/64, which is equivalent to 1.921875. The @CHOOSE function evaluates only the integer portion of the selector, so it selects *result1*, which is "01".

This section of the formula eliminates all values that fall outside of the range of values from 0 to 255. When you divide a negative number by 64, you get a negative number. When you divide a number larger than 255 by 64, you get 4 or greater. Both of these types of numbers are outside the range of results of this @CHOOSE formula, since the selector value can equal 0, 1, 2, or 3 only. The selector value in an @CHOOSE function can't be greater than the number of results in the list.

&@CHOOSE(@MOD(A1/16,4),"00", "01","10","11") evaluates @MOD(123/16,4), which is equivalent to 3.6875. Because the @CHOOSE function evaluates only the integer portion of the selector, it selects *result3*, which is "11".

&@CHOOSE (@MOD (A1/4,4), "00", "01","10","11") evaluates @MOD(123/4,4), which is equivalent to 2.75. Because the @CHOOSE function evaluates only the integer portion of the selector, it selects *result2*, which is "10".

&@CHOOSE(@MOD(A1,4),"00", "01","10","11") evaluates @MOD(123, 4), which is equivalent to 3. It selects *result3*, which is "11".

The ampersands concatenate the four two-digit portions, resulting in the string 01111011.

The following readers submitted winning entries: Bill Cox, Glendale, Ariz.; Roland Karsch, St. Charles, Ill.; Kenneth Tang, Mississauga, Ontario; Alan T. Tiet, Rosemead, Calif. ■

This material was prepared by Daniel Gasteiger and the Technical Editors.

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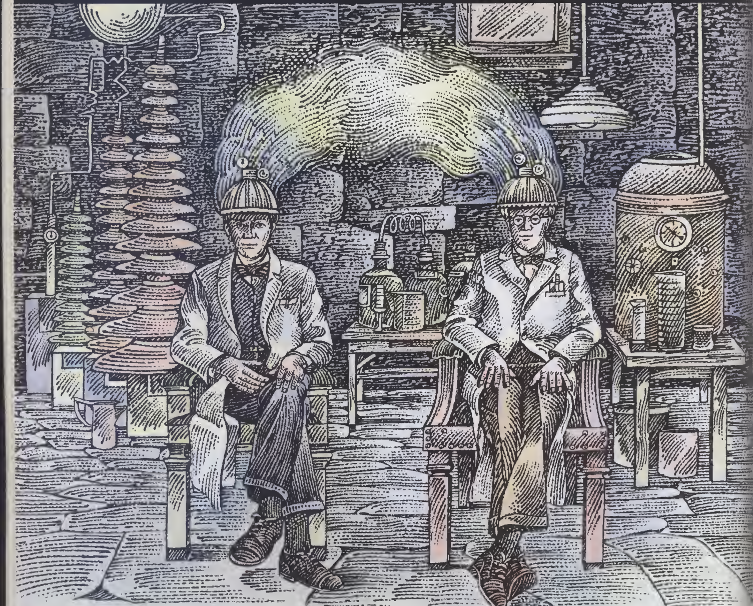

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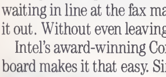

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SYMPHONY

CUSTOMIZE YOUR PRINT SETTINGS WITH NAMES

Since I print my annual report only once a year, it's easy to forget that it needs legal-size paper. To help me remember, I created a customized Print settings sheet, which I named *Legal*, and saved the file with the new settings sheet. Now whenever I print the report, the name of the Print settings sheet reminds me that I need to change the paper in my printer before printing the report.

You can also create Print settings sheets with appropriate names to print different reports from a single spreadsheet. For example, you may have one for portrait or landscape mode, for compressed or elite, and so on.

Phyllis Koch
Tony's Pizza Service
Marshall, Minn.

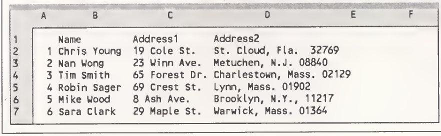
1-2-3

MAILING-LABEL MACRO

I've developed a short mailing-label macro that works in *1-2-3* Release 2 and higher. To see how it works, complete the following four steps:

1. Use the Data Fill command to enter a vertical list of numbers, as shown in column A of the figure below.

Enter the list of names in column B, the street address in column C, and the city, state, and zip code in column D. Select /Range Name Create, enter the name *list*, and specify range A2..D7.



```
      A      B             C              D                          E        F
1             Name          Address1       Address2
2           1 Chris Young   19 Cole St.    St. Cloud, Fla.  32769
3           2 Nan Wong      23 Winn Ave.   Metuchen, N.J. 08840
4           3 Tim Smith     65 Forest Dr.  Charlestown, Mass. 02129
5           4 Robin Sager   69 Crest St.   Lynn, Mass. 01902
6           5 Mike Wood     8 Ash Ave.     Brooklyn, N.Y., 11217
7           6 Sara Clark    29 Maple St.   Warwick, Mass. 01364
```

2. In range F1..F2 enter the labels *start* and *stop*. Select /Range Name Labels Right. Specify range F1..F2 to name cells G1 and G2 *start* and *stop*, respectively. In *start* enter the number of the first label you wish to print. In *stop* enter the number of the last label you wish to print.

3. In cell G8 enter the following:

@VLOOKUP($start,$list,A2)

Copy this formula to range G9..G10. Note that the offset argument, A2, becomes A3 in cell G9 and A4 in cell G10; this in turn points to columns B, C, and D. *1-2-3* will display the label represented by the number in *start*—that is, the first name and address—in range G8..G10. You need to set the width of column G as wide as the longest label so that *1-2-3* will not truncate any labels. Name range G8..G10 *label*.

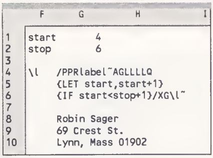
4. To create the macro, enter the labels in range F4..G6 in the figure at the top of the next column.

You'll have to increase or decrease the number of Ls in the macro, depending on the size of your label. Name the macro by selecting /Range Name Labels Right and specifying cell F4.

Hold down the MACRO key (Alt on most computers) and press L to start printing the labels you specified in the *start* and *stop* ranges above.

Here's how the macro works:

/PPRlabel~AGLLLLQ presses slash and selects Print Printer Range, enters *label* as the range to print, and selects Align Go Line Line Line Line Quit.



```
      F        G              H              I
1   start      4
2   stop       6
3
4   \l    /PPRlabel~AGLLLLQ
5         {LET start,start+1}
6         {IF start<stop+1}/XG\l~
7
8         Robin Sager
9         69 Crest St.
10        Lynn, Mass 01902
```

{LET start,start + 1} increases the value in *start* by one.

{IF start<stop + 1}/XG\l~ checks to see if *start* is less than or equal to *stop*. If it is, then *1-2-3* issues the branch command and restarts the macro. If not, the macro ends.

Charles S. Kafta
Eastern Stainless Co
Baltimore, Md

1-2-3/SYMPHONY

USING @@ TO HANDLE CHANGING RANGE NAMES

If you delete a range name in *1-2-3* and *Symphony*, all @functions that refer to that range name retain the cell addresses of the range, not the range name. Hence, the @functions will not refer to the new location if you want to use the deleted range name in another part of your worksheet.

To overcome this problem, I use the @@ function. For example, suppose you want to find the highest value in the *sales* column, which is range B1..B10. To do so, enter the label *sales* in cell A1, and enter the formula @MAX(@@(A1)) in cell A2. Cell A2 displays the maximum value in range B1..B10. Next, delete the range name *sales* and recreate the range as range C1..C10. Then press the CALC key. The result displayed in cell A2 is the maximum value in range C1..C10.

This technique is also useful for substituting different range names into an @function without first editing the @function. Using the example above, suppose you want to find the highest value in another range named *sales88* and to have the formula in cell A2 display the new value. You need only enter the new range name in cell A1, and the formula in cell A2 will be updated automatically to produce the highest value in *sales88*.

David Butler
London, Ontario

TRANSLATING dBASE III TO 1-2-3 AND BACK

I often translate *dBase III Plus* files into *1-2-3* or *Symphony* files by using the Translate utility. Sometimes I also need to translate the same database back to *dBase* format after doing some number crunching. But when I've tried, I've had trouble. During the translation from *1-2-3*, I received the error message *There is data missing from one or more fields in the database*. During the translation from *Symphony*, the computer locked up. After some research, I found a solution to these problems.

It seems that the Translate utility in both *1-2-3* and *Symphony* places label prefixes in the first row of the *1-2-3* or *Symphony* file. If this file is then translated back to *dBase III* or *III Plus*, the Translate utility interprets these prefixes as field names.

To work around the problem, I use the File Xtract command to extract the active portion of the database into its own file. I retrieve and resave the extracted file and then translate it back to the *dBase III* file format.

Mary Whiting
Berkeley, Calif.

FLAGGING DIFFERENCES BETWEEN TWO COLUMNS

I use the following technique when I want to find and flag any differences between the values in two columns.

For example, if I want to note any differences between the values in columns B and C, beginning in row 6, I move the cell pointer to cell D6. I enter the formula +C6−B6 in cell D6, and copy the formula down column D as far as necessary to include all values in columns B and C. Next, I set the width of column D to 1. I then select /Worksheet Global Zero Yes (in *Symphony*, MENU Settings Zero Yes Quit) to suppress any zeros in the worksheet. The formula in column D will cause an asterisk to be displayed when there's a difference between two adjacent cells. Otherwise, the formula will evaluate to a blank cell.

B J. Werges
Thomson Consumer Electronics
Syracuse, N.Y

If necessary, insert a column in which the highlighted differences will be listed. Remember, when you select /Worksheet Insert Column, 1-2-3 *inserts a column to the left of the one the cell pointer is in.*

The setting for zero suppression isn't saved when you save a worksheet. Each time you retrieve the file, you have to select zero suppression. You could, however, write an autoexecuting macro to do this for you.

FIND A LABEL ANYWHERE IN A DATABASE

Suppose you need to find a word or label that could be in any of the fields in any record in your database. If you're working in a database that has only a few fields, you could create different Criterion ranges for each field the word might be in. However, this process becomes unrealistic when the database has eight or more fields. I've found a way to get around this problem by using string concatenation. To see how this technique works, follow these steps:

1. Add a new field to your database and include it in the Input range (in *Symphony*, Basic Database range).
2. Use the Range Name Labels Down command to assign the field names as range names for each field in the first record.
3. In the cell below the new field name, enter a formula like the one below, concatenating all fields that could contain the entry you're searching for:

   +field1&field2&field3&field4

4. Copy this formula down that column as far as the records in your database reach.
5. Select /Range Value (in *Symphony*, MENU Range Values) and specify the column of formulas you just entered. When the program prompts you for the range to copy to, press Return to specify the first formula cell. This will leave only the values of the formulas in the new field.
6. Copy the new field name to the Criterion range and enter the following formula as the criterion:

   @FIND("*word*",*fieldname*,0)+1

   Make sure you write your criterion formula to test against the first record of the database. The criterion formula will evaluate to ERR if the word you're searching for isn't located in the first record. If the word is in the first record, the @FIND formula evaluates to a value that represents the position at which the word begins plus 1. *Word* is the string you're searching for. *Fieldname* is the field name of the new field. Then the database commands and @D functions evaluate all of the records in that database column.

7. Select /Data Query Find, and *1-2-3* will move the pointer to the first matching label.

   In *Symphony* create a new Database setting sheet to include the new field in both the Database and Criterion ranges. Select MENU Query Find to move the pointer to the first matching label.

8. Finally, perform the data-query functions.

Gary Young
Trumbull, Conn.

1-2-3 *Releases 2.2 and 3 provide a simpler technique for finding words or labels within a database or any other specified range. Select /Range Search, enter the range and the search string, select Formulas, Labels, or Both. In addition, if you choose the Replace option, enter a replacement string.* 1-2-3 *pauses at each instance of the string and asks whether or not to replace it with a new string.*

@INT COMES TO THE RESCUE OF @NOW

I ran into a problem while preparing a financial aging-analysis report. The actual aging calculation subtracts the date when we received a product for repair from the report date, which is calculated by @NOW. I assigned a fixed format with zero decimal places to the column labeled *Age*. This caused all the numbers to be displayed as whole numbers. The total, however, appeared to be off by one or two digits. I found the culprit to be the serial number for the current date and time. The @NOW formula uses the computer system's internal clock to generate this serial number, calculating the seconds to 14 decimal places.

For the formulas to give the correct results, use the formula @INT(@NOW), which evaluates to an integer value.

G D White
F1 Services
Cupertino, Calif

If you use 1-2-3 *Release 2.01 or 2.2, you can use @TODAY instead of @INT(@NOW) to save a few keystrokes. When you type* @TODAY *and press Return,* 1-2-3 *enters the formula @INT(@NOW) into that cell.*

1-2-3 *Release 3's @NOW function generates a date-and-time serial number, calculating the seconds to 15 decimal places.* 1-2-3 *Release 3 also contains the @TODAY function, which calculates the integer value of a date-and-time serial number. It doesn't convert the @TODAY function to @INT(@NOW).*

TOTALING SUBTOTALS

I needed to find an easy way to create a grand total of several subtotals in a column. I would normally create the formula by including each subtotal cell address, for example, +B10+B20+B25, and so on. I've found a timesaving method for creating such a grand total. Assuming that your grand total is the sum of all subtotals, use the @SUM formula to sum the entire column, then divide that sum by 2. You divide the sum by 2 because in effect you are adding the data twice.

For example, suppose your column of values and subtotals is in range B2..B65 and you want to store the grand total in cell B67. In cell B67 enter the formula @SUM(B2..B65)/2. This method assumes that you include in a subtotal all cells in the range. If you don't, the result will be incorrect.

Robert W Coons
Title USA Insurance Corp
Irving, Tex

USING @ISERR SUPPRESSES ERR IN FORMULA

I developed a *1-2-3* worksheet whose formulas and calculations are based on input cells, which may contain values or zeros, or which may be blank. When the denominator cell is blank or contains a label or a zero, the formula evaluates to ERR. At first I used an @IF statement like the following one:

```
@IF(B4/A4<=0,0,B4/A4)
```

The formula, however, still resulted in ERR.

I found that if I embed the @ISERR function within the @IF function, *1-2-3* suppresses the ERR. Assuming your formula is dividing cell B4 by cell A4, enter the following formula, which returns the result of B4/A4. If the division evaluates to ERR, the formula returns a zero.

```
@IF(@ISERR(B4/A4),0,B4/A4)
```

If you prefer to have the formula evaluate to a blank cell rather than to a zero when there is an ERR, adjust the formula to appear as follows:

```
@IF(@ISERR(B4/A4)," ",B4/A4)
```

Charlene Reeves
Chicago, Ill

If you use Symphony *Release 2.0, your first formula will evaluate to ERR when any input cell contains a label or when the formula's denominator is 0, an empty cell, or a label.*

HARDWARE

SYMPHONY, MOUSE, AND MODEM

I installed a mouse to use with my computer. When I ran *Symphony* and tried to use the mouse, the mouse did not work. I had a modem attached to my computer. After much trial and error, I found that the mouse works only if I attach it to the second serial port (COM2) and attach the modem to the first serial port (COM1). If you have the mouse and modem communications ports reversed, *Symphony* will not recognize the mouse.

Michael J Brassil
The Dentists Insurance Co
Sacramento, Calif

CHECK YOUR GENICOM 3404 EMULATION MODES

When I use the Genicom 3404 printer to print from *1-2-3* or *Symphony*, each page has some garbage characters printed at the top. I discovered that this occurs because I have the printer set in Epson emulation mode, but I installed it as the Genicom 3000.

The Genicom 3404 has three emulation modes: Genicom 3000, Diablo, and Epson with Graftrax Plus in parallel mode. Note that the third emulation mode may not be available, since this printer does not come standard with a parallel board.

To determine what mode your Genicom printer is in, take the printer off-line by pressing the on-line button (#9), then press the PRG button (#5). You will receive a test printout of all the settings in your printer. The printer will then prompt you to make changes or to exit.

Ralph Grant
Chicago, Ill.

KEYBOARD LOCKUP WITH 1-2-3, ALLWAYS, IRMA II

I recently encountered a problem while using *1-2-3* with the add-in *Allways* (Funk Software), which was set to be attached automatically upon loading *1-2-3*. The keyboard locked up each time I deleted a column or a row in a *1-2-3* worksheet and then invoked *Allways*. When I loaded *1-2-3* alone, however, the keyboard didn't lock up.

When I checked to see if I had installed any other memory-resident programs, I found that I had the following keyboard-device command in my CONFIG.SYS file, which is loaded each time I start my computer:

```
DEVICE=KYBDDRV.SYS  -2B
```

This device command, or driver, is used to remap the keyboard and was inserted in the CONFIG.SYS file when I installed the DCA Irma E78 Plus terminal-emulation software. I found that when I removed this statement from the CONFIG.SYS file and restarted the computer, I no longer experienced the problem with *1-2-3* and *Allways*. I can also load the Irma software without any problems.

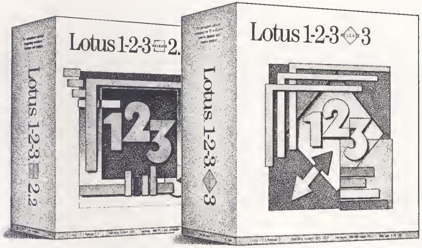
Frank Green
Boston, Mass.

This material was prepared by Subhadra Mattai and the Technical Editors, with the help of the Lotus Product Support staff

WRITE US

Do you have a favorite technique or way of using your Lotus products or of keeping your hardware and software on speaking terms? Share it! We'll send you $25 if we print your letter. Send them to: Good Ideas, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123.*

1-800-624-0503



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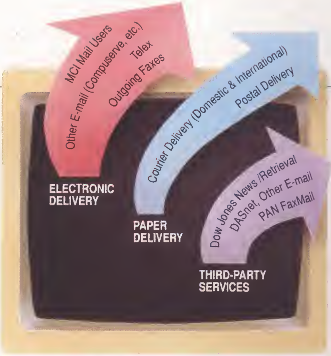
CIRCLE 120 ON READER SERVICE CARD

DATA TRANSFER

HOW TO GET MORE FROM MCI MAIL

Faxes, file transfer, and other hidden treasures

BY MARC DAVIDSON



In addition to E-mail, MCI Mail offers a number of other ways to send and receive information. Some services are billed at regular MCI rates, but others, including services offered by other companies in cooperation with MCI, cost extra.

It happens to every MCI Mail subscriber sometime. You have a proposal that must be delivered tomorrow, but you don't finish it until 10 P.M. Fax transmission won't yield the high quality output that you need, by now it's far too late for your usual overnight delivery service, and your correspondent doesn't subscribe to MCI Mail.

The choices in this situation seem limited: Use a messenger service at premium rates or miss the deadline. But if you're one of the roughly 100,000 subscribers to MCI Mail, there's a third choice. You can send the text to MCI by modem. MCI Mail will make a high-quality print on its own laser printers and will deliver the document anywhere in the United States by 5 P.M. the next business day.

If you aren't familiar with this electronic delivery option, you're not alone. Many people, including many MCI Mail subscribers, think of MCI Mail only as an electronic mail system—an impression kept alive at least in part by MCI's failure to document their services thoroughly. MCI offers more electronic mail features than most people realize, but it also offers alternative delivery options such as telex, fax transmission, and international courier service.

WHAT MCI OFFERS

Here are short descriptions of some of the most useful MCI features, along with MCI Help commands that can give you more information on each one. The box on page 102 tells more about how to use the MCI Mail Help commands.

Stand-alone fax machines have several noteworthy limitations. It's time-consuming to print a memo or spreadsheet and then feed the pages through a fax scanner. If you get a busy signal or have a transmission problem, with most fax machines you have to keep trying manually or else you have to tie up your fax machine while it keeps trying. If you have to fax the same document to several people, most fax machines require that you send each copy manually.

MCI Mail, on the other hand, can send an electronic letter to as many as 100 fax machines. As with all messages on MCI Mail, you can either type the text at the keyboard or send it as a file. By default, MCI Mail will keep trying to deliver the message for four hours, although you can set that period for anywhere from 30 minutes to 12 hours. The system will automatically confirm delivery or notify you of a failure.

In addition to saving time and effort, MCI Mail can save money. At 50 cents for the first half page and 30 cents for each additional half page, sending documents by MCI Mail within the continental United States can cost less than the price of a long distance phone call. Prices outside the United States are higher, but may still be less expensive than a phone call.

Be aware that faxes sent via MCI Mail can contain only text. You can't include a *1-2-3* graph, for example. And MCI Mail can send to Group 3 fax machines only. This should not be a problem, however, since the vast majority of fax machines in use today are Group 3 machines.

For more information about sending documents via MCI Mail, enter *help fax* at the MCI Mail prompt.

RECEIVING FAXES

Because fax transmission sends a picture of printed output rather than the ASCII text that computers can understand, you generally cannot receive faxes through MCI Mail. However, PAN FaxMail offers a service through MCI that scans a fax, uses optical character-recognition technology to convert the fax into ASCII text, and delivers the converted document to your MCI mailbox.

The conversion is not 100% reliable. The service claims better than 99% accuracy for most common typefaces, but the accuracy drops somewhat for proportionally-spaced type and dramatically for exotic typefaces such as Old English. Purely graphic information, such as sig-

Marc Davidson is a frequent contributor to LOTUS.

DAVE HANNUM

natures, letterheads, and drawings, is ignored.

For further information, contact PAN FaxMail through MCI (ID: 373-1774) or by phone at 215-584-0300.

WORKSHEETS AND OTHER BINARY FILES

MCI Mail won't let you send a worksheet, graphics, or formatted word-processor file through a standard communications program such as *Crosstalk Mk.4* or *Procomm*. But there are other programs that will let you perform these operations by taking advantage of the system's file-transfer capability. One such program is *Lotus Express*, available either from MCI Mail or Lotus. Note that to transfer a file with *Express*, both the sender and the recipient must use the program.

Even if you're not interested in the file-transfer capability of *Express*, you might want this $150 program as an alternate interface. MCI has no menus outside of its Help facility, and its on-line text editor is cumbersome. With *Express* you never have to see the MCI Mail interface or its editor. Instead, you give commands to *Express*, and *Express* communicates with MCI Mail to automatically send and receive your mail.

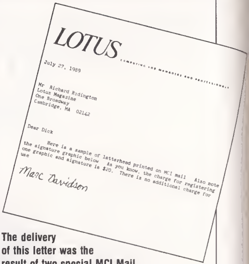
Express provides *1-2-3*–style menus to choose from, and a built-in text editor that lets you write a message as easily as you might with a word processor. Alternatively, it can import a text file. Once a message is written or imported, you can send it with just two keystrokes. Also, a $10 add-on to *Express*, called *Soft Fax for Lotus Express*, makes it easier to send faxes by providing a series of self-explanatory prompts for addressing the message.

For more information about *Express*, contact MCI Mail customer service at 800-444-6245, Lotus Direct at 800-345-1043, or a Lotus-authorized reseller.

DOW JONES NEWS/RETRIEVAL

Dow Jones News/Retrieval is one of the most popular business and financial on-line information systems. It currently offers more than 20 services, including stock quotes, airline schedules, weather, general news, and business news from *The Wall Street Journal*, *Barron's National Business and Financial Weekly*, and the Dow Jones News Service.

MCI Mail subscribers automatically have access to Dow Jones News/Retrieval without paying Dow Jones's annual fee. However, the usual Dow Jones connect charges apply, at rates ranging from 13 cents per minute to $2.80 per minute, depending on access baud rate, corporate or standard membership, and time of day. Simply enter *dowjones* at the MCI Mail menu. To return to MCI Mail, enter *disc*—short for disconnect. The charges will show up on your MCI Mail bill.



LOTUS

COMPUTING FOR MANAGERS AND PROFESSIONALS

July 27, 1989

Mr Richard Ridington
Lotus Magazine
One Broadway
Cambridge, MA 02142

Dear Dick

Here is a sample of letterhead printed on MCI mail Also note the signature graphic below As you know, the charge for registering one graphic and signature is $20. There is no additional charge for use

Marc Davidson

The delivery of this letter was the result of two special MCI Mail services. One service lets you include scanned logos and signatures in your messages, and the other delivers a laser-printed copy of that message the day after you send it.

For more information, enter *help dow jones* at the MCI Mail prompt.

SEND TO OTHER E-MAIL SYSTEMS

One limitation of electronic mail systems is the difficulty of exchanging E-mail messages with individuals who subscribe to other systems. MCI Mail partially overcomes this by offering mail connections to several other systems, including CompuServe, Missive (in France), Dialcom, Telemail, and the electronic mail services used at corporations such as Digital, IBM, and Wang, with still other connections to come. With each new connection, the chances increase that a client or associate will be a subscriber to a system that MCI can reach.

For those systems that MCI Mail does not normally reach, DA Systems Inc. offers DASnet to MCI Mail subscribers. With DASnet you can communicate with about 20 additional on-line systems, including AT&T Mail, EasyLink, and The Source, through MCI Mail. DASnet acts as an intermediary, forwarding MCI Mail as appropriate. As you would expect, there is a charge for the DASnet service over and above standard MCI Mail charges.

For more information about reaching other E-mail services, enter *help address EMS* or *help address X400* at the MCI Mail prompt. For more on DASnet, contact DASnet through MCI (ID: 304-0160) or by phone at 408-559-7434.

GETTING HELP

MCI Mail's wealth of options can be overwhelming. Here are four good sources for help:

On-line help. MCI Mail offers an impressive, complete on-line help system. If you're unsure of what to do at any time on the system, try typing *help* and pressing Return. In most cases you'll get a context-sensitive help screen. If you've never used the help system before, enter *help index* at the command prompt for a complete list of subjects for which help is available. To get help on specific topics, enter the appropriate help request at the command prompt. For example, to get information on distribution lists, enter *help lists*. "How to Get More From MCI-Mail" gives the appropriate Help command for each feature covered in the article.

Customer service. If you can't make sense out of the help screens, or are having trouble signing on, call MCI Mail's toll-free customer-service number: 800-444-6245.

The Complete MCI Mail Handbook. This very useful book by Stephen Manes (Bantam Computer Books, New York) provides a complete reference to every feature on the system, including useful undocumented features. MCI subscribers can order the book from the publisher through MCI Mail for $17.95. To do so, enter *create using* and then, at the prompt, enter *book order*. The book lists for $22.95 at bookstores.

Local agents. If you need more personalized attention—for instance, if you have a problem that customer service can't solve over the phone—ask for the name of the agent in your area. Local agents can generally solve problems that stump customer service. Because they are local, they can come to your office if need be. What's more, there is no charge for the service.

COURIER AND POSTAL DELIVERY

As noted earlier, MCI Mail can print your messages on its own laser printers and deliver the paper copy by courier service. A message posted by 11 P.M. Eastern time Monday through Friday is guaranteed delivery within the continental United States by 5 P.M. Eastern time on the next business day. Delivery is guaranteed by noon in most metropolitan areas. A message posted over a weekend is delivered on Tuesday. The price is $9 for the first six pages and $1 for each additional three pages. Courier service is available to about 100 countries, but prices vary outside the continental United States.

Alternatively, MCI can mail a printed message anywhere in the world. This can speed delivery substantially compared to mailing a letter yourself, since MCI prints the letter and mails it from the print center nearest the recipient. For example, mailing a letter from New York to California can often take five days. But sending it through MCI Mail, which prints the letter and mails it in California, can cut the time to one or two days. For postal delivery within the continental United States, the charge is $2 for the first three pages and $1 for each additional three pages.

For details on prices, availability, and the time required for courier or postal delivery to any given country, enter *help* followed by the name of the country at the MCI Mail prompt.

PERSONALIZED TRANSMISSIONS

When printing paper copy for courier or postal delivery, MCI can add your letterhead and signature. If you use the MCI standard command-based service, called advanced service, you can register up to 15 graphics, including letterheads and graphic renditions of signatures, at $20 each. You can choose which ones you want to use for any message. If you opt for the menu-based service, called basic service, you can register one graphic.

For more information, you can enter *help graphics* or *help graphics scan* at the MCI Mail prompt.

Telex is based on an old and slow technology, but it is still the most widespread standard for international communications. In fact, according to *The Complete MCI Mail Handbook* (Bantam Computer Books, New York) there are some countries in which telex is the only dependable service for international communications. MCI Mail will let you hook into the worldwide telex network without having to buy a telex machine.

You can both send and receive telex messages on MCI Mail. When sending, the system will confirm delivery of each message or notify you of a failure. Your MCI Mail telex number is 650 followed, without a space, by your MCI ID number without its hyphen.

For more information, enter *help telex* at the MCI Mail prompt.

DISTRIBUTION LISTS

MCI's distribution list option lets you send a message to as many as 100 recipients just as easily as sending to one. If you write to a large group regularly, such as all your company's sales representatives, you can create and save a list containing all the names. From then on, you can address the message to everyone at once by using the list name.

For each entry on a distribution list, you can use any delivery option. So, if some recipients are on MCI Mail, others use fax machines, and still others need paper copies delivered, you can still send the message to the entire group at once. Another nice touch is that each entry can be its own list. This means you can, for example, maintain a list of sales representatives on one list and include that list as a single entry on a larger distribution list. However, the total number of recipients per message is limited to 100.

In contrast, a distribution list can also consist of a single name. This is useful for addresses that are long enough to be a chore to enter—for telex or postal delivery, for example. Enter the address as a list of one, and you can address future messages by using the list name of 2 to 20 characters.

You can also share distribution lists—with others in your office, for example. As the creator, or owner, of the list, you can designate who else can use it and who gets charged for using it.

For more on distribution lists, enter *help lists* at the MCI Mail prompt. ■

IN BRIEF

MCI Mail. MCI Communications Corp., 1150 17th St. NW, Suite 800, Washington, DC 20036; 800-444-6245. Annual fee: $25 per mailbox. Instant letters: up to 500 characters—45 cents; from 501 to 2500 characters—75 cents; from 2500 to 7500 characters—$1; each additional 7500 characters—$1.

U S. Postal Service
Statement of Ownership, Management, and Circulation
(Required by 39 U S C 3685)

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	Average no copies each issue during preceding 12 months	Actual no copies of single issue published nearest to filing date
A Total no copies	385,512	385 000
8 Paid and/or requested circulation		
1 Sales through dealers and carriers, street vendors and counter sales	1,073	1,042
2 Mail subscription	371,982	372,683
C Total paid and/or requested circulation	373,055	373,725
D Free distribution by mail, carrier, or other means, samples, complimentary, and other free copies	2,570	2,496
E Total distribution	375,625	376,221
F Copies not distributed		
1 Office use, left over, unaccounted, spoiled after printing	8,897	7,818
2 Return from news agents	990	961
G Total	385,512	385,000

11 I certify that the statements made by me above are correct and complete.

—Mark D. Flanagan, Publisher

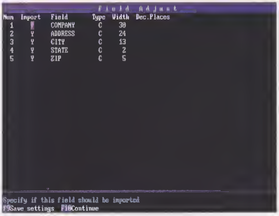
SOPHISTICATED DATABASE WORK VIA MENUS

Alpha Four offers a simpler alternative to *dBase IV*.

BY BILL LAWRENCE

Are you looking for an alternative to *dBase IV* that costs less, is easier to use, and reads *dBase III* files? If you don't need to program, *Alpha Four* will fill the bill. *Alpha Four* is designed to be used entirely through its menus, which are significantly faster than the plodding menus in *dBase IV*'s Control Center.

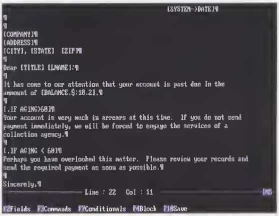
In the past, Ashton-Tate unwittingly created a market for Alpha Software Corp.'s database programs. If you wanted to use *dBase* files but didn't want to learn the programming skills necessary to manipulate those files effectively, Alpha Software's database programs were the answer. For *dBase II* there was *Alpha Database Manager II*, and for *dBase III* there was *Alpha/three*. *Alpha Four* appears to be the company's riposte to the latest version of *dBase*.



```
                            Field Adjust
Num  Import   Field        Type  Width  Dec.Places
 1     Y      COMPANY       C     30
 2     Y      ADDRESS       C     24
 3     Y      CITY          C     13
 4     Y      STATE         C      2
 5     Y      ZIP           C      5

Specify if this field should be imported
F9Save settings  F10Continue
```

FIGURE 1: When you import data from a *1-2-3* worksheet, *Alpha Four* displays the cell entries found in the first row of the worksheet. You can choose the columns you want to import and specify other information about the field before importing.



```
                                            [SYSTEM->DATE]¶
¶
¶
[COMPANY]¶
[ADDRESS]¶
[CITY], [STATE]  [ZIP]¶
¶
Dear [TITLE] [LNAME]:¶
¶
It has come to our attention that your account is past due In the
amount of [BALANCE.$:10.2].¶
¶
[.IF AGING>60]¶
Your account is very much in arrears at this time.  If you do not send
payment immediately, we will be forced to engage the services of a
collection agency.¶
¶
[.IF AGING < 60]¶
Perhaps you have overlooked this matter.  Please review your records and
send the required payment as soon as possible.¶
¶
Sincerely,¶
 ==================== Line : 22   Col : 11 ========================== INS

F2Fields  F3Commands  F7Conditionals  F4Block  F10Save
```

FIGURE 2: In the same print job, *Alpha Four*'s form letters can vary according to the criteria you specify. This letter prints the second paragraph if an account is more than 60 days past due; it prints the third paragraph if the account is less than 60 days past due.

FAST FILE LINKING

Just because *Alpha Four*'s menus make it easy to use doesn't mean it isn't a powerful data manipulator. It works faster with linked database files than *dBase IV* does, and it provides more reporting options, including a form letter generator. It imports data directly from a wider variety of programs than *dBase IV* does. It also imports selected fields of data from *1-2-3* or ASCII files—something that neither *dBase IV* nor many other database managers can do.

For most common database operations, *Alpha Four* is about as fast as *dBase IV*. *Alpha Four* is, however, the much faster program when you use it with linked database files—up to five times faster in my tests, depending on the operation. It's much slower when you use it to work with subsets of database files or to create indexes.

If you want to build applications for others, however, *Alpha Four* will restrict you in some ways. Because it has no programming language, you have few ways to customize the product. It does not run programs written in *dBase*'s programming language. Nor can you use it to create stand-alone database applications, as you can with *dBase IV*. It does have a macro facility that lets you automate menu selections, define custom menus, prompt the user for data, and incorporate that entry into your macro through a variable. The facility has no conditional statements, however.

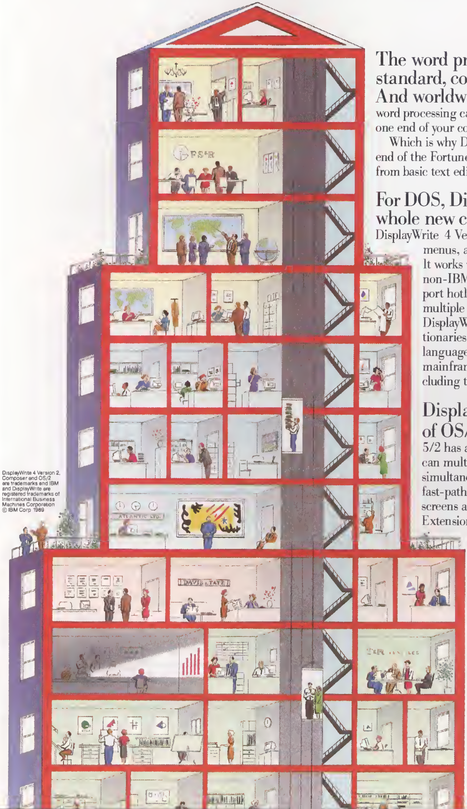
To show how *Alpha Four* works, let's run through a hypothetical application that uses data from *1-2-3* and your word processor. Suppose you have a list of customer names and addresses stored in your word processor's mail-merge format, and a list of customer purchases stored in *1-2-3*. From the two, you want to create mailing labels for only those customers who haven't made a purchase within the last 60 days.

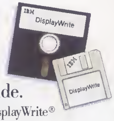
First, you import the purchase data from *1-2-3*. Let's say that each purchase record includes the customer's name, the date of the purchase, the products purchased, the payment terms, and the record of payment. For this mailing, all you need are the customer name and purchase date. *Alpha Four* displays a list of the cell entries that are stored in the

---

Bill Lawrence is a network engineer based in southern California.

Today's DisplayWrite. Word processing that works for you on many different levels.





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FEATURE COMPARISON: ALPHA FOUR VS. dBASE IV AND dBASE III PLUS

	Alpha Four	dBase IV	dBase III Plus
PRICE	$549	$795	$695
GENERAL FEATURES			
Maximum records per database	2,000,000,000	1,000,000,000	1,000,000,000
Maximum record size	4K	4K	4K
Maximum fields per record	128	255	128
Maximum indexes (automatically maintained)	7	47	7
Field types	Character, Numeric, Date, Logical, Memo	Character, Numeric, Date, Logical, Memo, Floating	Character, Numeric, Date, Logical, Memo
Viewing options	Forms, Customized forms, Browse tables, Customized browse	Forms, Customized forms, Browse tables, Customized browse	Forms, Customized forms, Browse tables
Reports	Columnar reports, Mailing labels, Custom forms, Form letters, Browse tables	Columnar reports, Mailing labels, Custom forms	Columnar reports, Mailing labels
SQL	No	Yes	No
RELATIONAL FEATURES			
Maximum related databases	10	10	10
Reports	Yes	Yes	Yes
FILE TRANSLATION			
Formats imported	1-2-3, Multiplan, VisiCalc, ASCII (character-separated)†, PFS:File, dBase III, DIF, Symphony, Alpha II	1-2-3, Multiplan, VisiCalc, ASCII* (comma-delimited), PFS:File, dBase III, Framework II, RapidFile	1-2-3*, Multiplan*, VisiCalc*, ASCII* (comma-delimited), PFS:File
Import single range	Yes	No	No
Direct export to mail-merge file	ASCII (character-separated)†, WordPerfect, MultiMate, Advantage II	ASCII (comma-delimited)	ASCII (comma-delimited)
APPLICATION GENERATOR	Yes	Yes	Yes (not via menu)
NETWORK FEATURES			
File locking	No	Yes	Yes*
Record locking	No	Yes*	Yes*
PROGRAMMING LANGUAGE	No	Yes	Yes

*This feature is available only through a programming language

†A character-separated file allows you to use any character, not just commas, to separate information

first row of your worksheet—in this case, the field names in your purchase-record file. Selecting from that list, you import only the fields you want. To do the same with *dBase IV*, you have to import the entire worksheet and then delete the fields you don't want.

Second, you import the word processor's mail-merge file into another *Alpha Four* database. If your word processor stores mail-merge files in ASCII format, you can import the file directly. Otherwise, you have to convert your mail-merge file to ASCII format. In order to take the kinks out of importing an ASCII file, you can tell *Alpha Four* to recognize whatever characters your word processor or other program uses to delimit fields in an ASCII file.

You now need to relate these two files so that each purchase date is matched with a customer name and address. *Alpha Four* creates this relation based on the field or fields that are common to both databases—in this case, the field with the customers' names. Specifically, the program matches the customer name that accompanies each purchase date in the purchase-record database with the address that accompanies that customer name in the address database.

Alpha Four helps you relate files by searching them for common fields and suggesting the first one it finds as the basis for the relation. You can also choose any other common field, or use substring functions to relate fields on the basis of only part of their contents.

Next you create mailing labels. Like *dBase IV*, *Alpha Four* displays a diagram of the label, on which you arrange the fields in the way you want them to be printed. Unlike *dBase IV*, *Alpha Four*'s mail-merge facility automatically closes up extra spaces between fields.

Finally, you have to create a subset of your database that includes only those customers who haven't made a purchase in 60 days. To do this, you write a function—similar to a *1-2-3* @function—that temporarily displays only those records you want. To create such a subset in most other database managers, you have to query your existing database and create a subset that itself is a new database file.

Alpha Four calls this subset a range. The program makes it easy to define a range by displaying a list of functions, field names, and mathematical operators. However, it takes *Alpha Four* longer to create a range than it takes *dBase IV* to execute a query. It took *Alpha Four* almost one and a half minutes to create a range based on an unindexed field in a 3,500–record database. *dBase IV* created the corresponding query in two seconds. Moreover, *Alpha Four* works more slowly with a range than *dBase IV* does with a file that results from a query.

Alpha Four lets you do some things with your data that are difficult to do in *dBase IV*. Suppose you decide to send each customer a cover letter along with a catalog. Unlike most database managers, *Alpha Four* has its own form letter generator, complete with a text editor. In the same printing session, you can have the letter include one paragraph for records that meet certain criteria, and a different paragraph for those that don't. For example, you can send a polite reminder to customers who haven't made a purchase in 90 days or less, and send a more straightforward sales pitch, such as a special offer, to customers who've bought nothing in more than 90 days.

You can define forms that you can use to look at records one at a time and to print them in a special layout. For example, you can design a form that serves as an order-entry screen and as a template for printing invoices. The records you view through a form may come from more than one database. When you need to enter data or to revise a record through the form, however, you can work with only one database at a time.

SPECIAL FEATURES

When you want to export updated data from your database back to *1-2-3*, an ASCII file, or your word processor, *Alpha Four* offers some unique efficiencies. When exporting data to *1-2-3*, you can rearrange the fields to be in any columnar order you wish. Each exported field's width and data type are determined automatically. If you use *WordPerfect* or *MultiMate*, you can export selected fields from your *Alpha Four* database directly to a mail-merge file.

Although it lacks a programming facility, *Alpha Four* does let you create custom menus for your database applications. Such menus let you select among various keystroke macros, which are merely records of the keystrokes needed to perform operations in *Alpha Four*. These macros can save time and confusion, but they cannot evaluate conditions, make choices, or respond to user error.

Alpha Four can also limit you if you need to create applications for widespread use. Unlike *dBase IV*, *Alpha Four* offers no way to create applications that you can use without *Alpha Four*. And although you can run *Alpha Four* on a network, there are no specific network features, such as file or record locking. ■

IN BRIEF

Alpha Four Version 1.0. Alpha Software Corp., One North Ave., Burlington, MA 01803; 617-229-2924. Runs on the IBM PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, 512K of RAM, and a hard disk with a minimum of 2 megabytes of available space. Released 3/89. $549. 30-day warranty against defective media.

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TESTS, SURVEYS, DISTRIBUTIONS: WHAT DO THEY MEAN?

@Stats **and** ***@Library-Statistical Applications*** **calculate statistics in your worksheet.**

BY PETER G. AITKEN

ROXANNA VILLA

Are your hiring policies fair? Are your improved sales attributable to your latest advertising campaign or to market fluctuations? If you keep your data in a *1-2-3* or *Symphony* worksheet, *@Stats* or *@Library-Statistical Applications* can help you get your answers.

Some of the add-in @functions contained in these two programs perform statistical calculations that you can duplicate by using only the most complex formulas or macros. If you use *1-2-3* or *Symphony* for statistical analysis, these @functions can help you perform your analysis faster and more reliably than you can now.

Some of the other @functions in the two programs generate statistics that are virtually impossible to generate within *1-2-3* or *Symphony*. If you've had to export data from your worksheet to a separate program for statistical analysis, these two programs allow you to recoup the advantages of doing that work in your worksheet.

@Stats and *@Library-Statistical* are quite different in scope, and you should refer to the table provided before choosing one of them. In general, *@Library-Statistical* ($79.95) provides the wider variety of statistical calculations. It is the preferred product if you work with descriptive statistics, such as means and standard deviations, or with probability distributions. The program also includes some @functions that make it easier to write additional statistical formulas of your own.

If you work with mathematical and linear statistics, *@Stats* ($295) will prove the more useful of the two programs. Otherwise, this collection is disappointing. In several areas where *@Stats* overlaps the functionality of *@Library-Statistical*, it does so less effectively. And in many cases, *@Stats*' @functions require some extra work either before or after you use them.

Wisely, neither program's manual tries to teach the complicated subject of statistics. However, *@Stats*' manual includes working examples, and it explains how some @functions work together with others. That may inspire some new uses for the @functions. *@Library-Statistical*'s manual does neither, so the program's use is limited to your knowledge of statistical applications.

DESCRIPTIVE STATISTICS

Both products include @functions that return basic descriptive statistics for a set of numbers stored in a range of your worksheet. All of these @functions ignore cells that contain a label or the values ERR or NA. That means they're less picky than *1-2-3*'s native @functions about the worksheet conditions under which they'll work.

In addition to its @functions, *@Library-Statistical* provides a separate add-in that generates a table of the basic 15 "univariate," or single-variable, descriptive statistics for values in a specified range of your worksheet. When you need to generate an entire set of statistics for a set of numbers, you'll find that using this add-in is easier than entering a separate @function for each statistic. This add-in contains four statistics unavailable via @ functions: the standard

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Peter G. Aitken is an associate medical research professor at a major eastern university.

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error of the mean, 1st quartile, 3rd quartile, and mode. So if you need any of these, you can get them only by using this add-in.

If you're a statistics expert, you'll appreciate *@Library-Statistical*'s @functions that calculate squares of sums and products. They make it a lot easier to write your own formulas.

Although *@Stats* covers fewer descriptive statistics, several of the @functions it does have let you restrict analysis to certain values within a range, such as "all values greater than *n*." *@Stats* also includes @functions that let you analyze values stored in a frequency-distribution table. However, you can't use these @functions to analyze tables created with *1-2-3*'s Data Distribution command. That means that you'll either have to produce these tables yourself or import them from another source.

SIGNIFICANCE AND PROBABILITY

Many people feel that statistical analysis, with its complex math and polysyllabic jargon, is a purely academic tool best left to scientists. But statistics can answer common business questions.

Suppose you need to recommend one of two proposed advertising campaigns. To do so, you devise a test. You show one ad campaign to a group of people, Group A, and the other ad campaign to a second group, Group B. Then you administer a test that scores on a scale of 0 to 100 each group's opinion of the product. The testing yields a score of 89 for Group A and 83 for Group B. Is the campaign you showed to Group A really more effective than the one you showed

@STATS VS. @LIBRARY-STATISTICAL APPLICATIONS: FEATURE COMPARISON

	@Stats	@Library
Sums of squares and related functions:		
Sum of squared deviations		✓
Sum of squared values		✓
Sum of (x*y)		✓
Sum of (x*y) squared		✓
Sum of (x − y) squared		✓
Sum of x squared − y squared		✓
Sum of x squared + y squared		✓
Covariance	✓	✓
Descriptive-statistics functions:		
Average deviation		✓
Geometric mean	✓	✓
Harmonic mean	✓	✓
Arithmetic mean	✓	✓(1)
Mode	✓	✓(1)
Median	✓	✓
Kurtosis	✓	✓
Skewness	✓	✓
Count of value cells in a range	✓	✓
Maximum value in a range		✓
Minimum value in a range		✓
Population standard deviation		✓
Sample standard deviation	✓	✓
Sum of values in a range	✓	✓
Population variance		✓
Sample variance	✓	✓
Standard deviation around a mean	✓	
Residual standard deviation	✓	
Standard error of the mean		✓(1)
1st quartile		✓(1)
3rd quartile		✓(1)
Range of values		✓(1)
Missing values		✓(1)
Probability distributions:		
Cumulative binomial distribution		✓
Chi-square distribution		✓
F distribution		✓
Normal distribution		✓
Poisson distribution		✓
Student's *t* distribution		✓
Mathematical functions:		
Factorial	✓	✓
Fibonacci sequence	✓	
Simpson's integral approximation	✓	
Linear interpolation	✓	
Combinations		✓
Permutations		✓
Linear-regression functions:		
Intercept	✓	✓
Slope	✓	✓
Correlation coefficient (r)	✓	
Correlation coefficient squared	✓	✓
Standard error of y estimate	✓	✓
Standard error of slope estimate	✓	
Durbin-Watson autocorrelation statistic	✓	
Ranks and percentiles:		
Ordinal rank		✓
Percentage rank		✓
Percentile	✓	
Significance tests:		
t test: equal variances	✓	✓(1)
t test. unequal variances		✓(1)
t test: paired samples		✓(1)
Analysis of variance 2-10 groups (single factor)		✓(1)
Chi-square test		✓
F test for two samples	✓	✓
Z test		✓
Functions that operate on frequency-distribution tables:		
Arithmetic mean	✓	
Sample standard deviation	✓	
Sample variance	✓	
Percentile	✓	
Skewness	✓	
Kurtosis	✓	

(1) These statistics are part of a separate add-in supplied with the program

to Group B, or is the difference in scores the result of chance?

What you need to know is the probability that this difference in scores would occur if the two campaigns were, in fact, equally effective. A statistic called the *t* statistic, the result of a *t* test, can help you determine this probability. Both *@Stats* and *@Library-Statistical* let you perform *t* tests in *1-2-3*. *@Library-Statistical*'s *t*-test feature is by far the more thorough of the two, but both programs suffer from shortcomings in this area.

> THESE PROGRAMS CAN HELP YOU PERFORM STATISTICAL ANALYSIS IN 1-2-3 AND SYMPHONY FASTER AND MORE RELIABLY THAN YOU CAN NOW.

To understand these shortcomings, you need some information about *t* tests. There are two types of *t* tests, and the one you use depends on the outcomes you're comparing. The case described above requires a *t* test for independent samples because the two sets of scores were obtained from independent groups of subjects. For a case in which each subject provides two scores, you use the *t* test for paired samples.

To further complicate matters, depending on whether the two sets of scores show an equal or unequal variance, you conduct the *t* test for independent samples in one manner or another. Variance is unequal if the range of one set of scores is significantly larger or significantly smaller than the range of the other set.

@Library-Statistical's *t*-test feature does not come as an @function but as a separate add-in. This add-in yields the *t* statistic and the corresponding probability mentioned above, as well as some other essential data. You can use the add-in to perform both types of *t* tests and for sets of scores that show equal or unequal variances.

Surprisingly, neither the add-in nor the manual tells you when to use a *t* test for equal variances and when to use a *t* test for unequal variances. That determination, however, is crucial to obtaining valid results. Still more frustrating is the fact that *@Library-Statistical* contains two @functions you can use to determine what kind of variance to use, but the manual makes no mention of this use of the @functions.

@Stats contains one *t*-test @function that you can use only for independent samples with an equal variance. The @function returns the *t* statistic only, leaving you to determine the probability. That task requires further calculation and reference to a *t*-statistic table, which *@Stats* does not provide. *@Stats* does provide an @function that can help you determine whether your sets of data show equal variance or unequal variance. But this too requires that you consult another table, not provided, for your final answer.

Unlike *@Stats*, *@Library-Statistical* includes a cumulative-binomial @function—another function you can use to determine the significance of an unexpected result. This @function returns the probability of obtaining a certain result by chance, given two possible results with known probabilities.

For example, suppose you're hiring several employees from a pool of equally qualified applicants, 40% of whom are women. If your hiring policies are fair, 40% of your new employees should be women. However, when you complete your hiring, you realize that only 32% of those hired are women. The cumulative-binomial @function gives you the probability of arriving at this result, given fair hiring practices. The lower that probability, the less likely it is that your hiring policy is fair.

MATH AND LINEAR STATS

@Stats and *@Library-Statistical* provide four and five @functions, respectively, that substitute for the Data Regression command in *1-2-3*. These @functions have two advantages over their command-based counterparts: They recalculate when you change the data in your worksheet, and you can use them in your formulas.

@Stats has three mathematical @functions not found in *@Library-Statistical*. One determines the area beneath a curve that is defined by data points stored in a range of your worksheet. A second returns the *n*th term in the Fibonacci sequence. A third @function, given a table of corresponding X and Y values, will calculate a Y value for each additional X value. All three @functions have useful applications in science and engineering.

@Library-Statistical's factorial @function calculates up to 170!. The similar @function in *@Stats* calculates no higher than 50!. *@Library-Statistical* also includes @functions to calculate combinations and permutations.

Each program has a percentile @function. *@Library-Statistical*'s percentile @function returns a value's percentile ranking among a set of values. *@Stats*' percentile function does the opposite: Among a set of values, it finds the value that ranks at a given percentile.

Rounding out *@Stats*' collection are @functions for the selective summing and selective counting of values in a range. With these @functions, you can execute the equivalent of an @DSUM or an @DCOUNT function without setting up a Criterion range in your worksheet. For example, given a list of employees and their monthly salaries, you could quickly determine the number of employees making more than $2,000 per month, or the total monthly payroll for employees making less than $1,500 per month. ■

IN BRIEF

@Library-Statistical Applications Version 1.0. IRG Information Systems, 100 North Country Rd., Setauket, NY 11733; 516-689-7682. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher and *1-2-3* Release 2/2.01 or 2.2 or any version of *Symphony*. Requires up to 26K of RAM above that needed for *1-2-3* or *Symphony*, plus 22K for the Add-In Manager, if used with *1-2-3*. Released 5/89. $79.95. 30-day, money-back guarantee; 90-day warranty against defective media. At press time, the publisher planned to release in 9/89 a version of *@Library-Statistical Applications* for *1-2-3* Release 3.

@Stats Version 1.0. Intex Solutions, 161 Highland Ave., Needham, MA, 02194; 617-449-6222. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher and *1-2-3* Release 2/2.01 or 2.2 or any version of *Symphony*. Requires up to 36K of RAM above that needed to run *1-2-3*, plus 22K for the *1-2-3* Add-In Manager, or 32K of RAM above that needed to run *Symphony*. Released 2/89. $295. 30-day, money-back guarantee; 30-day warranty against defective media.

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Article No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1 Excellent	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2 Good	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3 Fair	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4 Poor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5 N/A	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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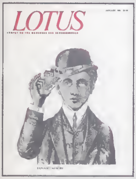

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SeeMore Version 2.0: Windows Unlimited

The first release of the *1-2-3* add-in *SeeMore* allowed you to choose among several sizes of screen fonts so that you could view more of your worksheet than you normally see on your screen. The new version for *1-2-3* Releases 2/2.01 and 2.2 also lets you define *Symphony*-like windows. *SeeMore*, like *Symphony*, lets you display data in as many windows as your screen can accommodate. Spreadsheets, databases, and graphs can share the screen.

The windows may abut each other ("tiled" windows), or they may overlap. You can easily resize, hide, and move the windows on your screen. The program also lets you superimpose a grid over the worksheet, as well as control all the colors of your display.

SeeMore's multiple windows can help in several ways. You can see disparate sections of your worksheet, so while you develop a macro in one window, you can see in another the data upon which that macro operates. You can view your data from different perspectives simultaneously, so in one window a graph can represent the data displayed in another window. You can enhance the what-if work you do by changing data in one window and watching the program automatically update one or more associated graphs in other windows.

PROTECT YOUR DATA

Finally, if you make on-screen presentations, *SeeMore* can enhance them. Among the fonts the program offers is a larger-than-normal font that can make a presentation easier to read.

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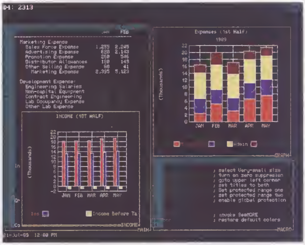

```
D4: 2313
                                 JAN      FEB
Marketing Expense
  Sales Force Expense          1,255    2,245
  Advertising Expense            620    2,143
  Promotion Expense              250      546
  Distributor Allowances         180      149
  Other Selling Expense           60       41
    Marketing Expense          2,395    5,123

Development Expense:
  Engineering Salaries
  Non-capital Equipment
  Contract Engineering
  Lab Occupancy Expense
  Other Lab Expense
```

```
; select Very-small size
; turn on zero suppresion
; goto upper left corner
; set titles to both
; Set protected range one
; set protected range two
; enable global protection

; invoke SeeMORE
; restore default colors
```

```
21-Jul-89   12:00 PM
```

SeeMore for 1-2-3 lets you define windows on your screen that work much like Symphony's windows. Graphs that reside in the windows are updated automatically when you change the data they represent.

As in *Symphony*, you can also use *SeeMore*'s windowing system to protect your worksheet from accidental damage. If you develop a worksheet in one window that requires you to insert or delete rows or columns, you can set that window to restrict the effects of such changes to a specified range. If you keep your macros in another window, outside that range, you won't lose the macro even if it resides on a row that you delete during the course of your spreadsheet work. You can also individually specify each window's settings for column widths, locked titles, hidden columns, and default cell formats.

There is one difference between *Symphony*'s windowing and *SeeMore*'s. In *Symphony* you can use the F6 key to hop between windows in any mode. In *SeeMore* the F6 key does not work when you're building formulas, and that's a big disappointment.

As in the previous version of *SeeMore*, you can display smaller-than-normal fonts on your screen to show more rows or columns. But the fonts must be the same in all windows. The fonts are quite readable, except for the smallest, which gave me eyestrain after a few minutes.

The benefit of displaying more rows and columns on your screen is that you can see the big picture without having to scroll back and forth through the worksheet. That's especially valuable if you work with 12-month budgets or financial statements, since the program lets you view all 12 columns at once.

SeeMore also offers EGA and VGA users the ability to assign colors to different elements of *1-2-3*'s display. You can create a palette of 16 colors from which you make your assignments, but as with fonts, the color assignments apply to all windows on the screen. There is no way within the program to store different sets of color or font assignments. If you need to change them often, you have to use an inconvenient method that involves renaming files in DOS.

SCREEN SLOWDOWN

The price you pay for customizing your display with *SeeMore* is a significantly slower screen-response time. However, this new version seems no slower than the original, which did not have the color capability. The effect, if you have a Compaq Deskpro 386 or other 80386-based computer, is that the worksheet scrolls more slowly. If you have an IBM PC or other 8088-based computer, you will also notice the extra time it takes to redraw the screen.

If you use an 8088-based computer, you will probably need to keep *1-2-3* set for manual recalculation. In the prerelease version of *Seemore* we saw, it helped to use tiled rather than overlapping windows; the tiled windows responded to changes more quickly. If speed is important to you and graphics aren't, you'll want to use *SeeMore*'s text-only version for EGA and VGA displays, which speeds display response considerably. This version is included with each program.

As adroit as *SeeMore* is, it affects only your display, leaving your printouts unchanged. If you use the add-in *Allways* to enhance your printed reports, *SeeMore* will relinquish control of the screen while *Allways* is active. —*Tom Carlton*

SeeMore Version 2.0. Personics Corporation, 63 Great Road, Maynard, MA 01754; 508-897-1575. Requires *1-2-3* Release 2/2.01 or 2.2. Runs on the IBM PC, PS/2, and compatible computers. Requires one of the following: CGA, MCGA, EGA, Extended EGA, VGA, IBM 8514/A, Hercules Graphics Card or Graphics Card Plus, or the display adapters that come with the 3270 PC, the Toshiba 3100 and 5100, the AT&T 6300, and the Compaq Portable III.

SeeMore comes as two add-ins. The font and color-control add-in uses from 40K to 80K of RAM; the windowing add-in uses 35K. Released 8/89. $99.95; $25 to upgrade from a previous version.

CIRCLE 1 ON READER SERVICE CARD

BUSINESS, FINANCE

Analyze Buyouts for Medium-to Small-Size Businesses

Buy-Out Plan lets you organize and analyze the complex financial data necessary to evaluate a leveraged buyout or the acquisition of a public or private business worth $100 million or less. The software lets you analyze the target company's historical performance, compare that performance with others in its field, and project its post-sale performance for up to 10 years. The program also lets you consider 12 types of funding instruments for a leveraged buyout, including bank notes, revolving loans, and term debt, subordinated debt, and convertible debt. And you can consider customized note arrangements with several flexible parameters. You can also assess the impact that retaining the business's current management or replacing it will have on the company's post-sale performance.

The program includes 13 checks against defaulting on the terms of a loan. You can project income statements, balance sheets, and cash flow statements over 10 years, as well as project up to 50 new fixed-asset purchases. Built-in inflation tables let you evaluate the effects caused by the fluctuation of prime interest rates, a downturn in the economy, and other factors. A utility, *Report Writer*, lets you generate a lengthy, written financial proposal that contains an executive summary, current financial figures, and graphics. The written-report file is dynamically linked to worksheet cells for easy report updating. You can download the report file into any of the popular word processor or desktop-publishing packages.

SUZETTE BARBIER

Requires *1-2-3* Release 2.01, 2.2, or 3 and at least 640K of RAM. $690 including *Report Writer*; $195 for *Report Writer*, from ValueSource, 1939 Grand Ave., San Diego, CA 92109; 800-825-8763.

CIRCLE 2 ON READER SERVICE CARD

Manage Small 401(k) Plans

401KPC lets you administer a 401(k) plan for up to 50 participants. You can track a participant's individual account within each of four investments and life insurance. The software will automatically insert salary deferrals and matching contributions into each account, or you can key them in. An input worksheet lets an employer fill in key information so that it can be given to a third-party plan administrator. The software provides several discrimination tests to make sure your 401(k), pension, and profit-sharing funds meet federal guidelines. You can prepare a variety of reports, including individual participant statements, employer reports, discrimination compliance reports, as well as the IRS Form 5500C worksheet.

Requires *1-2-3* Release 2.01, 2.2, or 3. Manufacturer recommends an IBM PC AT or compatible computer with 640K of RAM. $1,000 includes 90 days of free telephone support; $300 annual subscription fee for updates and an additional year of telephone support. From Wen-Set Enterprises, Suite 237, 2604 Elmwood Ave., Rochester, NY 14618; 716-473-9509.

CIRCLE 3 ON READER SERVICE CARD

Assess Tax Consequences of Changes in Income, Dependents

89Watifs is a *1-2-3* template for estimating the federal-tax consequences of earning different amounts of money, buying or selling a house, and changing the number of your dependents. The template parallels the line entries on IRS Form 1040 and Schedule A. If you are self-employed, the program lets you decide how much your quarterly estimated payments should be as your income changes.

Requires *1-2-3* Release 2.01 or 3 and uses approximately 100K of RAM. $20, from Wipple Software, P.O. Box 111642, Campbell, CA 95011-1642; 408-374-4279.

CIRCLE 4 ON READER SERVICE CARD

UTILITIES

dBase Memory Manager Swaps Applications and TSRs

Trading Places improves upon the Run command found in *dBase III Plus* and *dBase IV*. This command is similar to the System command in *1-2-3*. The program lets you run 15 popular applications that you don't have enough memory for while you're using *dBase*. That includes *1-2-3* Release 2.01, *Symphony* Release 2.0, *WordPerfect* 3.0 and higher, *Framework II* and *III*, and others.

Trading Places works by temporarily storing *dBase* on your hard disk. The utility also lets you keep in RAM any one of up to 16 terminate-and-stay-resident (TSR) programs of your choice and swap it for any one of the other 15. The memory overhead for the swap function is 27K of RAM plus the memory requirement for the largest of the 16 exchangeable TSRs. You can store an additional 16 TSRs in an overlay buffer. Only a 15K kernel of an overlaid TSR occupies RAM, making this method better than swapping when memory is very tight. The swap and overlay buffers reside on your hard disk and may be used separately or together.

Runs on the IBM PC, PS/2 Model 50 and higher, and compatible computers with DOS 2.1 or higher. Requires 256K of RAM as a stand-alone package. The manufacturer recommends 640K of RAM if you run it with *dBase*. $99.95, from Ashton-Tate Corp., 20101 Hamilton Ave.,

Add-in Toolkit for Lotus 1-2-3 Release 3 Provides New Spreadsheet Customization

Lotus recently announced shipment of the Lotus Add-in Toolkit for 1-2-3 Release 3, a set of programming tools designed to enable a broader range of corporate application developers and commercial software vendors to create more powerful, secure and tightly integrated enhancements to 1-2-3 Release 3.

1-2-3 Release 3 represents the first implementation of this new technology for customizing and extending Lotus applications, code-named LEAF. The Add-in Toolkit allows developers to exploit the new technology.

Using the Add-in Toolkit for 1-2-3 Release 3, corporate application development groups, departmental PC experts and advanced macro users can now create add-ins ranging from custom @functions, macro keywords and input screens to complete end user applications such as generalized reporting programs or executive information systems. The new Toolkit provides these developers with a superior means for customizing and extending the spreadsheet's capabilities, because resulting applications can be more sophisticated, yet are easier to maintain and control than those created using traditional approaches such as macros. Lotus has also been working extensively with a number of commercial vendors throughout the design and beta testing of the Add-in Toolkit for 1-2-3 Release 3. As a result, several vendors already have products under development including: Frontline Systems, Funk Software, General Optimization, Intex Solutions, IRG Information Systems, Personics, Spreadsheet Solutions and Symantec Corporation. Using the Toolkit's powerful new tools, these developers can create add-ins more efficiently, resulting in shorter time to market. More than a dozen add-ins for 1-2-3 Release 3 are under development, and several are expected to be available this year.

"Lotus pioneered the concept of add-ins in 1986 with the Lotus Developer Tools, a set of Assembly language routines which allowed commercial developers to create enhancement products that tapped directly into 1-2-3," said Frank Moss, Vice President of Lotus' Networked Applications and Systems Division.

"This technology resulted in a wide variety of products which extend the power of 1-2-3 Release 2.01 and 1-2-3 Release 2.2. With the Add-in Toolkit for 1-2-3 Release 3, we're delivering new programming power to a wider range of application developers and PC users. The new Toolkit enables all developers to build upon 1-2-3 Release 3's new technologies, providing end users with tailored applications for specific business needs, and ensuring that corporations are better able to leverage their investments in PCs and software."

Tools for Application Developers

The Add-in Toolkit for 1-2-3 Release 3 consists of a set of application programming tools enabling developers to directly manipulate spreadsheet objects such as cells, ranges and worksheets. Included in the Toolkit are an editor, compiler, and debugger, documentation and sample applications, and the 1-2-3 Release 3 Library, which allows programmers to gain access to 1-2-3's functionality.

The Add-in Toolkit for 1-2-3 Release 3's key benefits for developers are:

- *the ability to integrate custom applications into 1-2-3, reducing training time and costs;*
- *compiled code, for better security, control and performance;*
- *programmer efficiency, because developers can use the Lotus engine for memory management, screen and printer control, graphing, arithmetic and database operations;*
- *the ability to document spreadsheet applications, for easier updating;*
- *the ability to write programs in modules or building blocks, which can be re-used*

System Requirements

The Toolkit requires 1-2-3 Release 3, an IBM PC AT, PS/2, Compaq or compatible (with an 80286 or 80386 processor), a hard disk, and 2 megabytes of system RAM under DOS or 4 megabytes of system RAM under OS/2. The product supports DOS 3.0 or higher, and OS/2 1.0 and 1.1. OS/2 1.1 is required when using the debugger.

Toolkit Availability

The Lotus Add-in Toolkit is available at a suggested retail price of $395.

Contact your Lotus Authorized Reseller or **call Lotus SELECTS, 1-800-635-6887, to purchase the Lotus Add-in Toolkit for 1-2-3 Release 3.**

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CIRCLE 5 ON READER SERVICE CARD

Lock Up Your Hard Disk

FastLock effectively denies access to your hard disk to anyone who doesn't know your password. Once you unlock your hard disk, it reports to you any attempt at unauthorized access. After three attempts have been made to gain access without the correct password, it sounds an alarm. The software encrypts the file-allocation table (FAT), as well as the floppy drive from which you can start your system, which means that no one can start your system from DOS by using a floppy disk. The program makes backup copies of the FAT, which you can retrieve if the original becomes corrupted, and it parks the disk heads in safe sectors when you turn off your computer.

Runs on the IBM PC, PS/2, and compatible computers with a hard disk. $69.95, from Rupp Corp., 835 Madison Ave., New York, NY 10021; 212-517-7775.
CIRCLE 6 ON READER SERVICE CARD

One List of All Your Files

FindDir can make a catalog of all your files regardless of the medium on which you store them, including tape and floppy-disk backups. The number of catalogs is limited only by your available disk space. You can sort the catalog several ways, and you can search for files by volume label, file name, file extension, path, or any range of times or dates. You can combine more than one search criterion. For example, you can search for all *1-2-3* file names that begin with the letter T and that were updated between any two dates. The software lets you display the sorted entries alphabetically by disk or by date. The program runs as a pop-up, except from within *Microsoft Windows* and some other graphics applications, or as a stand-alone program. The catalog is a DBF file, so to print disk labels or the directory, you must use a program that reads *dBase III* files.

Runs on the IBM PC, PS/2, and compatible computers with 512K of RAM and DOS 3.0 or higher. Uses 8K of RAM as a pop-up. Manufacturer recommends a hard disk. $49.95, from The Madison Software Co., 384 Post Oak Rd., Madison, MS 39110; 601-856-9953.
CIRCLE 7 ON READER SERVICE CARD

Circumvent DOS Commands

Shortcut Software Inc. provides six utilities designed for easy use. *Disk/Director* lets you copy, move, rename, and delete files and directories on your floppy or hard disk, as well as create hard-disk directories and subdirectories. *File/Find* lets you locate files on floppy or hard disks by name, extension, or range of dates. *Lock/File* lets you password-protect and encrypt individual files or an entire disk. *Pack/File* lets you compress and decompress files, directories, or the entire contents of floppy or hard disks. *View/File* lets you look at the contents of any file without loading the application in which the file was created. *Word/Find* lets you locate any word in a file name or within a file. The software displays the file location of the word and each line of text containing the word.

Each program runs on the IBM PC, PS/2, and compatible computers with 384K of RAM and DOS 2.1 or higher. $24.95 each, from Shortcut Software, 7525 Ethel Ave., Suite M, North Hollywood, CA 91605; 800-543-5653.
CIRCLE 8 ON READER SERVICE CARD

OTHER SOFTWARE

Control Screen Appearance in Symphony Applications

*Symphony Show*Case!* is a *Symphony* add-in that lets you control the appearance of the screen in applications that you develop. You can make the screen look completely different from the familiar *Symphony* screen. For example, a FORM window used for entering expenditures could look like a blank check rather than like the traditional FORM window. The add-in lets you create help screens and place error messages anywhere on the screen. It helps you develop applications faster by letting you save each design to a file that can be recalled by using an @function.

Requires any release of *Symphony* and uses 20K of RAM. $295; $5 for demo version that emulates the program and uses 70K of RAM. From Q-Soft, 666 Godwin Ave., Suite 220, Midland Park, NJ 07432; 201-445-0956.
CIRCLE 9 ON READER SERVICE CARD

Run Crosstalk in Windows

Crosstalk for Windows works with Xmodem, Ymodem, Zmodem, Kermit, CompuServe B, and Crosstalk's DART file-transfer protocols. It supports DEC VT52 and VT102 and IBM 3101 monochrome terminal standards. It also supports CompuServe Vidtex medium-resolution and high-resolution graphics and IBM PC color graphics (ANSI color-terminal specifications) terminal standards and works with communications speeds from 110 to 19,200 bits per second. A script language, which includes a keystroke-capturing learn mode, conditional branching, string manipulation, and integer math, lets you automate the program's operation.

You can configure 48 function-key combinations to control automated procedures and use a pull-down menu to list your key-combination selections. The software works with asynchronous, autodial, and high-speed modems. Like other *Microsoft Windows* applications, it has pull-down menus, dialog boxes, on-line indexed help, mouse operation, background operation, and the Dynamic Data Exchange file protocol.

Requires *Microsoft Windows*/286 or 386 versions 2.1 or higher (a run-time version of *Windows* is not supplied, nor will the program work with such a version) and uses 150K of RAM. Runs on the IBM PC, PS/2, and compatible computers with 500K of free hard-disk space and an internal or external modem. $195; $95 in U.S. and Canada, $110 international, to convert from *Crosstalk XVI* or *Crosstalk Mk.4*. From Crosstalk Communications, 1000 Holcomb Woods Pkwy., Suite 440, Roswell, GA 30076; 404-998-3998.
CIRCLE 10 ON READER SERVICE CARD

TRAINING

Release 3 Training for Users with Some Spreadsheet Skills

Lotus 1-2-3 Release 3 is a two-volume course that teaches those with a basic understanding of spreadsheets how to use the new features in Release 3. Volume 1 covers working in the 3-D environment, new commands, consolidating data from multiple worksheets, and graphing. Volume 2 covers working in multiple files, setting up macro libraries, using the Rec-

SUZETTE BARBIER

ord feature, and linking and graphing database files. Each volume includes a videotape, a 3½-inch and a 5¼-inch practice disk, and a training guide.

Requires *1-2-3* Release 3. $595 both volumes; $325 apiece in VHS, Beta, PAL (European), or ¾-inch video format. From Anderson Soft-Teach, 2680 North First St., San Jose, CA 95134; 408-434-0100.

CIRCLE 11 ON READER SERVICE CARD

Beginner and Advanced Courses in Releases 2.2 and 3

The Lotus 1-2-3 Learning System provides an introductory course in basic spreadsheet skills, such as creating macros, databases, and graphs, as well as in some features peculiar to Releases 2.2 and 3. The Advanced 2.2 Learning System module teaches, among other things, new range and add-in features, file linking, updating cells, and graphing with *Allways*. The Advanced 3 Learning System module covers multiple worksheets, imported data, text and graphics in reports, new graphics functions, and alternate display modes. Each module includes a videotape, a data disk, and a manual.

Requires *1-2-3* Release 2.2 or 3. $495 apiece for VHS or Beta video format; $595 apiece for ¾-inch format; $895 for the introductory and one advanced course on VHS or Beta video format; $1,095 for the same package on ¾-inch format. From MicroVideo Learning Systems, 91 Fifth Ave., New York, NY 10003; 800-231-4021, in N.Y. 212-255-3108.

CIRCLE 12 ON READER SERVICE CARD

HARDWARE

Scan Text and Graphics Into 1-2-3 and Word Processors

The Kurzweil Discover Freedom comprises a board, software, and drivers that let you scan text from popular scanners into *1-2-3*. It lets you scan both text and graphics into 16 popular word processors, including *WordPerfect* 4.2 and 5.0, *Microsoft Word* 5.0, as well as into ASCII file formats. You can scan a document from an unsupported format and create a custom format from it. The board and software retain the original document's typefaces, as well as multiple-column, portrait, and landscape formats from any typeset, near-letter-quality, dot-matrix-printed, or laser-printed document. Supported scanners include Hewlett-Packard's HP ScanJet and HP ScanJet Plus, Microtek's MS-300A, DEST PC Scan, and all Datacopy scanners.

Runs on the IBM PC XT, PS/2 model 30-286, and compatible computers with 640K of RAM and a hard disk. $3,995, from Xerox Imaging Systems, Kurzweil Products, 1215 Terra Bella Ave., Mountain View, CA 94043; 800-821-2898, in Calif. 415-965-7900.

CIRCLE 13 ON READER SERVICE CARD

UPGRADES

Personal Finances with Lotus Version 3.0 takes advantage of features in *1-2-3* Release 3. Running with *1-2-3*, the finance-management package now links all of its worksheets, which include budget, net worth, stock portfolio, bond portfolio, and options portfolio. For example, using its Hotgraph feature, you can see a pie-graph summary of your net worth. You can set the screen to look like a worksheet or to look like a traditional money-management program. The program now takes advantage of multiple-file integration. For example, you can easily compare the actual expenditures from the checkbook worksheet with the budget-sheet figures. An on-line tutorial explains the differences between the old and the new versions of the product.

Requires *1-2-3* Release 3 and at least 1 megabyte of RAM. $99; free upgrade from Version 2.0; $5 for demo disk. From Automated Reasoning Technologies, 2805 Spring Blvd., Eugene, OR 97403; 800-289-7638.

CIRCLE 14 ON READER SERVICE CARD

EZ-PrintSet Version 1.2 now lets you print to a file or to a printer one or more named print sets at a time. For example, if you have four named print sets, you can specify that you want to print number 2 and number 4 or all of them, and the software executes the command.

Requires *1-2-3* Release 2/2.01 or 2.2 and uses 30K of RAM. $49.95, from Lichtman Industries, Lackawanna Plaza, Millburn, NJ 07041; 800-545-5564, in N.J. 201-467-0010.

CIRCLE 15 ON READER SERVICE CARD

TaxInterest Version 2.0 computes 11 different federal tax penalties, as well as those for New York, California, Illinois, and Michigan. You can compute federal tax penalties for such infractions as failure to file, failure to pay the tax owed on your return, failure to pay an assessment, fraud, negligence, and overstatement or understatement of reported values. A new manual provides a reference guide for penalties, examples of routine assessments, and a comparison of payment methods. A pop-up menu helps simplify the job of generating reports. A separate service for $50 per year provides quarterly updates of federal tax tables and those of the four states listed above.

Runs on the IBM PC, PS/2, and compatible computers with 512K of RAM. $149, from TimeValue Software, 4 Jenner St., Suite 100, Irvine, CA 92718; 714-727-1800.

CIRCLE 16 ON READER·SERVICE CARD

IBM Storyboard Plus 2.0 works with an 8514/A video adapter and its associated memory-expansion kit to display 640-by-480-pixel resolution with 256 colors. The software also allows you to combine lower resolutions in the same PC-based presentation. A new single-key, quick-save feature lets you save screens created with the Picture Maker module. Version 2.0 also supports video capture by using Truevision TARGA 16, Chorus PC Eye, Jovian VIA, and the new IBM Video Capture cards. An expanded library of animation sequences also supports the higher resolution. You can create backgrounds that blend two colors, convert text screens into the *Storyboard* PIC graphics-file format for greater editing flexibility, and export files in either the TIFF or PCX graphics-file format.

Runs on the IBM PC, PS/2, and selected compatible computers with 528K of available RAM, a CGA, EGA, or VGA card, and a color display. Supports a mouse. $395; $140 to upgrade, from IBM Corp., 472 Wheelers Farms Rd., Milford, CT 06460; 800-426-2468.

CIRCLE 17 ON READER SERVICE CARD

RightWriter 3.1 adds more than 500 new rules for parsing data and for detecting grammar and style errors. The program will check for grammar and style errors that are commonly made by those for whom English is a second language. It's now easier than in previous versions to select files because a menu lists all the files residing on your hard disk. You can call up *RightWriter* from within *WordPerfect* 5.0. The program directly reads files from *Microsoft Word* 5.0, *Microsoft Works, pfs:First Choice*, and *IBM Writing Assistant*.

Runs on the IBM PC, PS/2, and compatible computers and uses 384K of RAM. $95, from RightSoft, 4545 Samuel St., Sarasota, FL 34233; 800-992-0244.
CIRCLE 18 ON READER SERVICE CARD

BOOKS

The Lotus Guide to Learning 1-2-3 Release 2.2, by Lotus Development Corp. Complete description of Release 2.2's features, tutorials for beginning-level and intermediate-level users, and a section on macros. Published September 1989, 550 pages, $22.95 (paperback), from Addison-Wesley Publishing Co., Reading, MA 01867; 617-944-3700.
CIRCLE 19 ON READER SERVICE CARD

Douglas Cobb's 1-2-3 Handbook, Release 2.2 Edition, by Douglas Cobb, with Steven S. Cobb and Gena B. Cobb. Covers all of Release 2.2's features. Published November 1989, 800 pages, $26.95 (paperback), from Bantam Books, 666 Fifth Ave., New York, NY 10103; 212-765-6500.
CIRCLE 20 ON READER SERVICE CARD

The 1-2-3 Upgrade Guide, by E. Michael Lunsford. Compares Release 2.01 to Releases 2.2 and 3. Published August 1989, 350 pages, $16.95 (paperback), from Bantam Books, 666 Fifth Ave., New York, NY 10103; 212-765-6500.
CIRCLE 21 ON READER SERVICE CARD

Lotus 1-2-3 Release 3.0: The Bridge Book, by Simon Moores. Compares and contrasts Releases 2.01, 2.2, and 3. Published July 1989, 210 pages, $19.95 (paperback), from Brady Books, Simon & Schuster, 15 Columbus Circle, New York, NY 10023; 212-373-8142.
CIRCLE 22 ON READER SERVICE CARD

1-2-3 Spreadsheet Design, by John M. Nevison. Includes tips for all releases of *1-2-3*, including 2.2 and 3. Published July 1989, 304 pages, $21.95 (paperback), from Brady Books, Simon & Schuster, 15 Columbus Circle, New York, NY 10023; 212-373-8142.
CIRCLE 23 ON READER SERVICE CARD

Total 1-2-3/Release 3, by Peter Randall and Steven Bennett. Covers all changes in features between Releases 2.01 and 3. Published July 1989, 838 pages, $24.95 (paperback), from Brady Books, Simon & Schuster, 15 Columbus Circle, New York, NY 10023; 212-373-8142.
CIRCLE 24 ON READER SERVICE CARD

Encyclopedia of Lotus 1-2-3: Release 3: The Master Reference, by Robin Stark. Defines and gives examples of all Release 3 commands, functions, and features. Published September 1989, 496 pages, $34.95 (hard cover), $24.95 (paperback), from Windcrest, a division of Tab Books, Blue Ridge Summit, PA 17294-0850; 800-822-8158, in Pa. and Alaska 717-794-2191.
CIRCLE 25 ON READER SERVICE CARD

Lotus 1-2-3 Simplified, Release 3, by David Bolocan. Covers the features of Release 3, tells how to customize the program, and also provides a library of applications. Published September 1989, 272 pages, $26.95 (hard cover), $16.95 (paperback), from Windcrest, a division of Tab Books, Blue Ridge Summit, PA 17294-0850; 800-822-8158, in Pa. and Alaska 717-794-2191.
CIRCLE 26 ON READER SERVICE CARD

The Stephen Cobb User's Handbook to Lotus 1-2-3, Release 3, by Stephen Cobb. Covers Release 3's functions, networking options, and expanded macro capabilities. Published October 1989, 448 pages, $24.95 (paperback), from Windcrest, a division of Tab Books, Blue Ridge Summit, PA 17294-0850; 800-822-8158, in Pa. and Alaska 717-794-2191.
CIRCLE 27 ON READER SERVICE CARD

1-2-3 Database Techniques, by Dick Andersen and Bill Weil. Covers database fundamentals, application tips, and add-ins. Published October 1989, 450 pages, $22.95 (paperback), from Que Corp., 11711 North College Ave., Carmel, IN 46032; 800-428-5331.
CIRCLE 28 ON READER SERVICE CARD

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1-2-3 Graphics Techniques, by Steve Sagman. Covers graphing spreadsheet data and customizing graphs in Releases 2.01, 2.2, and 3. Published November 1989, 450 pages, $22.95; from Que Corp., 11711 North College Ave., Carmel, IN 46032; 800-428-5331.
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1-2-3 Release 2.2 Business Applications, by Que Corp. Book and disk set covers business applications in spreadsheet and databases. Published November 1989, 550 pages, $39.95 (paperback and disk), from Que Corp., 11711 North College Ave., Carmel, IN 46032; 800-428-5331.
CIRCLE 30 ON READER SERVICE CARD

1-2-3 Release 2.2 Quick Reference, by Que Corp. Guide to basic functions and commands in Releases 2.01 and 2.2. Published August 1989, 160 pages, $7.95 (paperback), from Que Corp., 11711 North College Ave., Carmel, IN 46032; 800-428-5331.
CIRCLE 31 ON READER SERVICE CARD

1-2-3 Release 2.2 QuickStart, by Que Corp. Designed for beginning users of Releases 2.01 and 2.2; includes 200 pages of illustrations. Published September 1989, 450 pages, $19.95 (paperback), from Que Corp., 11711 North College Ave., Carmel, IN 46032; 800-428-5331.
CIRCLE 32 ON READER SERVICE CARD

Using 1-2-3 Release 2.2, Special Edition, by Que Corp. Update of the million-copy seller *Using 1-2-3* now covers Releases 2.01 and 2.2. Published August 1989, 850 pages, $24.95 (paperback), from Que Corp., 11711 North College Ave., Carmel, IN 46032; 800-428-5331.
CIRCLE 33 ON READER SERVICE CARD

The Winn Rosch Hardware Bible, by Winn L. Rosch. Reference tool for operating and customizing the IBM PC, PS/2, and compatible computers. Published May 1989, 640 pages, $29.95 (paperback), from Prentice Hall Trade, 15 Columbus Circle, New York, NY 10023; 212-373-8142.
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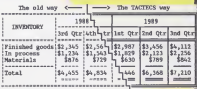

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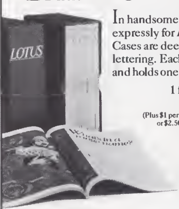

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ESSAY

SOFTWARE FOR THE 1990s

BY JIM MANZI

In the business world, one of the least addressed and most important developments during the 1980s is that most businesspeople have become computer literate. They've also become more technologically sophisticated. Thus they expect and deserve more from computer technology than they did even a couple of years ago. It is up to Lotus Development Corp. and other software-development companies to meet those expectations.

Success in business today depends on getting and using information. This fact will become even more apparent as time goes on. You can't manage people or projects without information. And if that information isn't organized to maximize its value, it is nearly worthless.

In the 1980s personal computing has meant a PC bundled with, for the most part, personal-productivity applications that are easy to learn and use. In the 1990s personal computing will mean heterogeneous computers that are linked together on a network and that can run compatible personal-productivity applications. I don't suggest that personal computing will go away. Rather, personal computing is evolving from individual computers to groups of networked computers. Driving this trend toward network computing is the convergence of PC and workstation technologies on the corporate desktop.

In the 1990s Lotus will, and other software vendors should, extend the qualities of existing personal-computing products to network applications. That will enable groups of users to benefit from the functionality that applications for personal computers have been providing for individuals. With common standards, desktop systems will serve as links to minicomputers and mainframes, acting as file servers and data repositories on the network. Graphical user interfaces will achieve their greatest potential by making the networked computer easy to use.

Our view of the future of software is one in which users can collaborate with one another while they use an application. Today, for example, spreadsheet users pass information to each other over a network in a way that is similar to using interoffice mail. One user changes a worksheet, then makes that worksheet available to other users for subsequent changes. In the future, programs will allow more team-oriented analysis, in which users interact with each other directly through the software. Initially, users may be able to exchange data directly between spreadsheets. Ultimately, people who are remote from one another will be able to work together on a single spreadsheet that is accessible to anyone on the network.

Consider the following scenario of a budget consolidation on a spreadsheet. Such an application wasn't possible in the 1980s, but it will become commonplace in the near future.

Company A's sales department creates regional quarterly reports on sales across a product line. A quarterly quota-report system has been developed to measure each region's performance against quota by product. After the department completes each quota report, it includes that data in a sales report that it submits to senior management for review.

A vice president of sales in the Northeast, reviewing the report in his spreadsheet, notices that sales in the southern region are lower than expected. He pops up a memo editor and composes a memo to that region's sales manager, asking if the figures and assumptions in the report are correct. The memo and a part of the spreadsheet are sent automatically to that manager.

The southeastern sales manager reviews his original alternatives, composes a reply, changes some figures in the worksheet, and sends the response back to the vice president.

The vice president receives the response, and his spreadsheet is automatically updated to reflect the sales manager's changes. At the same time, the original information is saved. The update can come through the network as an addition to a set of versions, a replacement, a merge, or some other operation.

This is a simplified scenario. The capability exists today to handle even more-complex spreadsheet-based tasks on a network. And there is no reason why this type of collaboration can't take place with other applications. In fact, Lotus and our beta-test partners are already doing it with *Lotus Notes*, which is designed to manage textual information for groups. It will be available by the end of this year.

The transition to collaborative computing won't happen overnight. And it will involve fundamental shifts in the software industry, ranging from product development to distribution and customer support. Once the industry has completed the shift, both the software products and their vendors of the mid-1990s will look far different and will offer even more value to customers than they do today. ■

Jim Manzi is president and CEO of Lotus Development Corp.

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